

Hubert Smith

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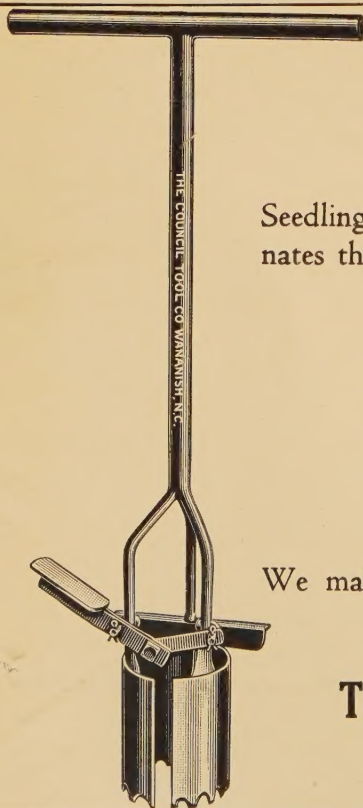
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CONTENTS



Editorial: Let's Have a Show-Down	613
Foresters in Land-Use Planning	615
Charles Lathrop Pack—1857-1937	622
TOM GILL	
The Austin Cary Memorial	624
H. S. NEWINS	
The Plan for the Austin Cary Memorial	626
W. H. REINSMITH	
Forest Industry Will Do Its Part	631
W. B. GREELEY	
Cooperative Effort in Forestry	639
HENRY S. GRAVES	
The Forest Despoilers of Pennsylvania's Anthracite Region	645
A. C. SILVIUS	
Cornell: An Appreciation	649
BRISTOW ADAMS	
Tree-Fork and Steel Tape for Close Measurement of Small Diameters	654
W. H. CUMMINGS	
Private Forestry: Its Meaning and Objectives	661
J. H. PRICE	
Comments	665
T. D. WOODBURY	
Recreation Planning in the National Parks	668
L. F. COOK	
Forestry in Nova Scotia	671
G. W. I. CREIGHTON	
Some Interrelations of Wildlife Management and Forest Management	674
N. W. HOSLEY	
Effect of Applying Acid Lead Arsenate for Control of Japanese Beetle Larvae on the Germination and Development of Evergreen Seedlings	679
WALTER E. FLEMING	
FRANCIS E. BAKER	
LOUIS KOBLITSKY	
Briefer Articles and Notes	689
Reorganization of the Department of Forestry at Cornell University; Memorandum for Heads of Forest Schools; Report of the Conservation Committee, Southern Pine Association; Red Squirrels Attack Japanese Larch; An Improved Paint Spray Outfit for Numbering Trees.	
Reviews	695
C.C.C. Forestry; Norway Spruce in Northeastern United States—A Study of Existing Plantations; Our National Resources and Their Conservation; Development and Succession of Forest Fungi and Diseases in Forest Plantations; Forest Pocket Book; Introduction to Research on Plant Diseases; International Yearbook of Forestry Statistics. Vol. 1, Europe and U.S.S.R.	
Correspondence	701

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EDITORIAL

LET'S HAVE A SHOW-DOWN

ALMOST two years have passed since on August 29, 1935, President Roosevelt signed the Fulmer bill which authorized the federal government to aid the states in acquiring land to be administered as State Forests. The Fulmer Act carried no actual appropriation but provided for later appropriations totalling \$5,000,000 annually.

Before its passage the Fulmer bill was vigorously supported by the Chief Forester, U. S. Forest Service. The Association of State Foresters fought militantly for the bill. It had the support of the Society of American Foresters, the American Forestry Association, and other state and national conservation groups. When the bill was enacted in 1935 it was regarded, and properly so, as of equal importance with those five other great advances in American forest legislation: the Act of March 3, 1891, authorizing the President to create National Forests; the Act of February 1, 1905, transferring the National Forests from the Department of Interior to the Department of Agriculture; the Act of March 1, 1911, authorizing federal purchase of lands for National Forests in the East; the Act of June 7, 1924, providing federal cooperation in protecting state and privately owned forests from fire and in growing and distributing forest planting stock; and the

Act of May 22, 1928, providing a federal program for forest research.

In 1936 and again in 1937 a serious and effective effort was made by the Association of State Foresters and other interested groups to secure an appropriation to carry out the intent and purpose of the Act. In 1937 the Bureau of the Budget recommended \$1,000,000 for this item, but, strangely enough, it is reported that the House Appropriations Committee eliminated the entire sum from the Agriculture Appropriation bill.

From the point of view of practical politics, it would appear that an appropriation to carry out the provisions of the Fulmer Act would have wide support. Practically every state would benefit directly and indirectly. The pressure placed on the federal Forest Service to acquire areas which may or may not fall within the scope of present or projected acquisition programs would be lessened. The crushing load of extensive tax delinquency of once forested land now carried by many states would be somewhat reduced. Support and direction would be given to state forestry programs. The wishes of well informed public opinion would be met. And yet no appropriation has been made or appears to be contemplated by the present session of Congress, despite the fact that the Agriculture Ap-

propriation bill now being considered by the House provides \$3,000,000, \$500,000 more than the budget estimate, for federal acquisition under the terms of the Weeks Act. The Senate Appropriations Committee later approved only the budget estimate of \$2,500,000.

It is not contended that \$3,000,000 is an excessive sum for federal acquisition. Anyone familiar with the magnitude of the problem knows that it is utterly inadequate. Neither is the claim made, directly or implied, that the Fulmer Act is a cure-all for all state forest problems as they exist today. All that is intended is to call attention to the fact that at the moment it appears that the Forest Service will receive for its acquisition program more money than was provided for by the budget estimate, whereas the budget estimate of \$1,000,000 for cooperative acquisition has gone the way of all flesh.

Some states have made a conscientious effort to grapple with their own forestry problem. A few states, notably New York and Pennsylvania, have made significant progress. Many states, however, neither have the wealth nor the public sentiment on which an effective system of state forests can be built. It appears quite probable that acceptable progress in the solution of the problem will be made only if and when federal cooperation becomes available.

No sensible person believes that the Fulmer Act should replace federal acquisition under the terms of the Weeks Act. Nevertheless, it is widely believed to be another step in the right direction. Why then does Congress show such reluctance to undertake a program which has had such sympathetic support from

both federal and state forest agencies, and which it itself endorsed in principle? Certainly it cannot be because of economy, because the budget estimate for federal acquisition was increased by the very same committee that eliminated funds for carrying out the provisions of the Fulmer Act. What then are the causes?

It is not unlikely that there is some difference of opinion among those qualified to express an opinion, concerning the merits of a cooperative forest land acquisition program as contemplated under the Fulmer Act. It is quite probable that some foresters believe that the cause of forestry can be served best if such federal funds as may become available for forest acquisition are used exclusively to acquire forest land under federal control. There may be some question whether all the states are ready to embark on a program of state forest acquisition and administration. In fact, the very competency of the forest departments of certain states might be questioned. With such differences in opinion, if openly expressed and openly arrived at, no one could object, however much one might question their basis or validity. The printed record, however, shows little or no opposition to the Fulmer Act. It has been regarded almost universally as a great step forward in forest legislation. Foresters, therefore, would be interested to know what hidden forces, if any, are at work that hinder or deter Congress from making an appropriation to carry out a program militantly supported by both federal and state forest agencies. The interests of forest conservation always can be served best by putting all the cards on the table. Let us have a showdown on this issue!

FORESTERS IN LAND-USE PLANNING

STATE planning, carried on by official boards with technical consultants, is a comparatively recent governmental activity. Practically all the states now have functioning planning boards set up by their governors. In some states foresters have assisted in this work almost from its inception; in others, forestry and forest conservation have not received adequate attention. Recognizing the increasing importance of state and regional planning, the Council of the Society of American Foresters adopted a resolution endorsing the program as one in which foresters should participate, and in which forestry should have a place along with the other technical, social, and economic problems of land use.

RESOLUTION APPROVED BY THE COUNCIL

Whereas, it is felt that there is some field for a measure of governmental control of land use, and whereas unrestricted and unwise land clearing and cultivation in some localities threatens to lessen the benefits of the forestry and soil conservation programs, therefore,

Be it resolved, that the Council go on record as advocating that this situation be considered in all rural zoning legislation and be it further resolved that a copy of this resolution be submitted by the Executive Secretary to each State Planning Board within the territory of the Section.

Whereas, the field of activity of the several State Planning Boards is very properly being constantly enlarged, and whereas it has frequently occurred that forestry problems have not been given due consideration by such Boards, therefore,

Be it resolved, that the Society of American Foresters urge the use of a forestry consultant by each State Planning Board.

The following letter was sent to the secretary of each State Planning Board, in conformance with the resolution adopted by the Council:

April 5, 1937.

The field of operations of the State Planning Boards covers subjects of vital interest to the Society of American Foresters. The first effective development of land-use planning in the United States arose in connection with the reservation of public domain lands for National Forests, and the acquisition and retention of lands by certain states for permanent forestry uses. The attack thus launched against the prevailing dogma that all lands are better off in private hands was the entering wedge to all subsequent land planning.

More recently, there has developed a serious conflict between the multiple use theory of public reservations as practiced in National and State forests, and the single use idea of preserving intact, solely for recreation, areas of wilderness and parks, thus excluding and terminating all possible utility of these lands except that of public access.

Foresters do not oppose the creation of parks where such use justifies the economic sacrifice involved, but find themselves in conflict with grandiose plans for unlimited extension of parks where no consideration is paid to the vital economic needs of the public and locality. People must live and work in order to enjoy recreation.

The latest developments include a nation-wide extension of the program for conservation of soil and water, control of floods, and of wind and water erosion, including also rural resettlement. These programs involve land acquisition on a large scale. Forestry constitutes a major use of such acquired lands as well as those remaining in private ownership.

The tremendous interest in the preserva-

tion and restoration of wildlife involves restoration of breeding grounds in swampy areas, acquisition of game preserves, and a close coordination with forestry and range management. The use and regulation of the public range constitutes another great program of land-use planning, involving control of erosion, coordination with forestry, and cooperation with agricultural interests, especially in the West.

Foresters constitute the first and the oldest body of professional men whose field is based on sound coordination of all phases of land-use planning. During the last 40 years a body of trained men has been developed, numbering some 8,000, whose entire outlook and experience has forced them to consider land use as a whole, rather than any one narrow phase of it such as parks, wildlife, erosion or grazing.

For these reasons the Society believes that State Planning Boards should include in their membership a representative of the profession of forestry and this matter is respectfully called to your attention.

H. H. CHAPMAN,
President.

The following acknowledgments were received by President Chapman in reply to his letter of April 5 in which was enclosed a copy of the Council's resolution.

WALTER H. BLUCHER, EXECUTIVE DIRECTOR, AMERICAN SOCIETY OF PLANNING OFFICIALS, CHICAGO, ILL.

I am very glad to have your letter of April 22d together with the accompanying copy of the letter addressed to all State Planning Boards.

As consultant to the Michigan State Planning Commission several years ago, I learned at a very early date about the real contribution which was being made to planning by the foresters. In my asso-

ciation and contact with them I found them very much in advance of most other persons on land planning, very cooperative, and doing an exceedingly worthwhile job in an excellent manner. They are making a real contribution to land planning.

It is because I know all these things that I have not hesitated to commend the foresters to the various planning agencies, and to urge closer cooperation.

CHARLES P. MESSICK, CHAIRMAN, NEW JERSEY STATE PLANNING BOARD, TRENTON, N. J.

We acknowledge your letter of April 5th.

You may be interested in knowing that our State Forester is designated as a member of the State Planning Board in the statute.

WAYNE D. HEYDECKER, DIRECTOR, DIVISION OF PLANNING, EXECUTIVE DEPARTMENT, ALBANY, N. Y.

This will acknowledge the receipt of your circular letter of April 5 expressing the opinion that state planning boards should include in their membership a representative of the profession of forestry, and resolutions urging planning boards to employ a forestry consultant.

The personnel of the State Planning Council is fixed by statute in this state at five persons and, therefore, the board can not well be increased. However, there are upon it persons of broad vision who, I am confident, sympathize with the views which you have expressed. As a matter of fact in the work of the Division we maintain the closest contact with the Department of Conservation of the State of New York, not only with respect to the Division of Parks but also with the equally important Divisions of Fish and Game and Forestry.

MORTON L. WALLERSTEIN, CHAIRMAN,
VIRGINIA STATE PLANNING BOARD,
RICHMOND, VA.

This will acknowledge with thanks yours of the 5th instant with enclosed resolution.

I think I may say for your information that I doubt if there is a state planning board anywhere that enjoys a closer or finer relationship with the forestry interest than our Board. It occurs to me that the important factor in the matter concerning which you write is the development of such a cooperative arrangement and that the question of membership on the board should, to say the least, be secondary in importance to that.

MISS ELIZABETH M. HERLIHY, CHAIRMAN,
MASSACHUSETTS STATE PLANNING
BOARD, BOSTON, MASS.

We have read carefully your letter of April 5th together with the resolution approved by the executive council, urging the use of a forestry consultant by each State Planning Board. We agree entirely with your findings but owing to the modest funds available, we have been obliged to combine certain functions. Our associate consultant is a land-use economist and gives due regard to forest uses. Also we have in the state service a trained forester whom we may call upon for cooperation and assistance.

M. W. TORKELSON, DIRECTOR OF REGIONAL PLANNING, WISCONSIN STATE PLANNING BOARD, MADISON, WIS.

I am in receipt of your letter of April 5 in which you state the following:

"More recently, there has developed a serious conflict between the multiple use theory of public reservations as practiced in National and State forests, and the single use idea of preserving intact, solely for recreation, areas of wilderness

and parks, thus excluding and terminating all possible utility of these lands except that of public access."

You say that foresters do not oppose the creation of parks where such use justifies the economic sacrifice involved, etc. Later you say that foresters constitute the first and oldest body of professional men whose field is based on sound coordination of all phases of land-use planning, etc., and wind up with the suggestion that State Planning Boards should include in their membership a representative of the profession of forestry.

If you will refer to the names on this letterhead, you will observe the State Conservation Director is a member of the Board. The State Conservation Department is charged with the management of the state parks and state forests. Usually the State Conservation Director is represented at the meetings of the State Planning Board by Mr. F. G. Wilson who is a forester in charge of cooperative forest crop management.

From the foregoing I think you will agree that our Board is constituted in accordance with your suggestion.

Incidentally such ideas as we have as to land-use seem to be in accord with your own. We have large areas in Wisconsin which should not be farmed although there are some people living there trying to make a living farming and incidentally incurring expense for roads and schools. We are trying to encourage the taking of steps which will cut out the expense in connection with these areas. The Conservation Department has a very effective system of fire prevention in effect which aims to keep the forest areas from burning up. We think, however, that there are places where we should provide recreational areas and think that this ought to be done close to the thickly settled areas where the people really can enjoy them.

Space does not permit the setting forth

of our ideas in full, but we do not think you would seriously disagree with us.

A. H. WIETERS, SECRETARY, IOWA STATE PLANNING BOARD, DES MOINES, IOWA

I have your letter of April 5th addressed to me as Secretary of the Planning Board relative to the use of a forestry consultant by each State Planning Board.

I feel sure that problems of forestry have been given consideration by the Iowa State Planning Board from the very beginning.

Dean H. H. Kildee of the College of Agriculture of Iowa State College, Ames, Iowa, who has represented the agriculture interests on the Planning Board and also has been Chairman of the Planning Board since its inception, has shown great interest in forestry problems and has had on his various committees dealing with land-use technical advisers in forestry problems.

Likewise, Mrs. Henry Frankel, who has represented the conservation interests of the Planning Board, has been very active and sympathetic with the forestry problems as part of the general conservation program.

I believe that I am correct in saying that in every land-use or conservation project of the State Planning Board forestry interests have been well represented by Prof. MacDonald of Iowa State College, who has acted as a consultant in forestry matters for the State Planning Board since its very inception.

H. H. KILDEE, CHAIRMAN, IOWA STATE PLANNING BOARD, DES MOINES, IOWA

Mr. A. H. Weiters, Secretary of the Iowa State Planning Board, has forwarded to me your letter of April 5, and a copy of his letter to you under date of April 9.

Mr. Wieters has very clearly stated the

relationship between Professor G. B. MacDonald and the forestry interests which he represents, and the Iowa State Planning Board. Professor MacDonald has been a member of the Land Use Committee of the Iowa State Planning Board, and Chairman of the subcommittee on parks, forests and game preserves. Furthermore, he has been a member of the small central committee on Land Use. This committee has reviewed and approved all recommendations of the Iowa State Planning Board relative to land utilization policies and programs. He also works very closely with the Iowa State Conservation Commission, which organization has membership on the Iowa State Planning Board. Professor MacDonald is in charge of a state fund which is being used to purchase marginal land for reforestation and game projects.

I have read with interest the resolution approved by your Executive Committee and I wish to report that the Iowa State Planning Board is in full accord with your statement relative to the importance of using a forestry consultant. We know that we are fortunate in having Professor MacDonald in the state to serve in that capacity.

S. L. GALPIN, ASSOCIATE CONSULTANT,
WEST VIRGINIA STATE PLANNING
BOARD, MORGANTOWN, W. VA.

Mr. Wilson has referred your letter of April 5 regarding representation of trained foresters on State Planning Boards to me. It should please you to know that the West Virginia State Planning Board contains in its membership of ten, Major H. W. Shawhan, director of conservation, a trained forester of some twenty years' practical experience and Dr. C. R. Orton, head of the young but flourishing forestry department at the West Virginia University, and that in addition the serv-

ices of Mr. T. W. Skuce, assistant state forester, have been and are now utilized in directing the Board's work on forestry, land ownership, tax delinquency and recreation.

E. A. WOOD, DIRECTOR, THE TEXAS PLANNING BOARD, AUSTIN, TEXAS

We have received your letter of April 5 concerning the conflict between the multiple use theory of public reservations as practiced in National and State Forests, and the single use idea of preserving intact, solely for recreation, areas of wilderness and parks.

We also note that your Society believes that state planning boards should include in their membership a representative of the profession of forestry. We greatly appreciate your calling our attention to this matter and beg to advise that your letter will be presented to the next meeting of the Texas Planning Board, which will be held on April 16. For your information we beg to advise that the law creating the Texas Planning Board requires that forestry be represented by one member. Mr. Ernest L. Kurth, President of the Southern Pine Association and Vice President of the Angelina Lumber Company is the representative of forestry on the Board. In addition to this representation, our Board keeps closely in touch at all times with Mr. E. O. Siecke who is Director of the Texas Forest Service.

We have also received copy of resolution approved by the Executive Council of the Society of American Foresters in February 1937. This resolution, together with your letter, will be presented to the Board.

LEO V. HORTON, DIRECTOR, NEW MEXICO
STATE PLANNING BOARD, SANTA
FE, N. M.

Your letter of April 5th has been re-

ceived and I heartily agree with the contents therein.

The New Mexico State Planning Board has had a representative of the Forestry Department on all of our important committees wherein forestry development or land use within or adjacent to forests was concerned, and we find that their advice is very valuable. The forestry officials of New Mexico have been very generous and have shown a keen interest in the Planning Board work, and we appreciate their attitude.

Mr. Pooler, Regional Forester in Albuquerque, and Mr. Andrews, Supervisor of the Santa Fe National Forest, have been especially cooperative in all Planning Board activities.

Our Planning Board suffers from lack of finance, and it would be impossible for us to employ a separate forest consultant; however, we will continue to call on members of the Forest Service in New Mexico and advise with them on all problems involving land use.

V. B. STANBERY, CONSULTANT, OREGON
STATE PLANNING BOARD, PORTLAND,
OREGON

Many members of the Society of American Foresters assist in the land-use planning activities of the Oregon State Planning Board. Mr. C. J. Buck, Regional Forester, U. S. Forest Service Region No. 6, is a member of the planning board. At least twenty professional foresters, members of the Society, are working on the several Advisory Committees on Public Lands, O and C Lands, Land Classification and Use, Forest Resources, Roadside Protection, Wild Life, Economic Problems and Regional Plans and Special Studies.

Our research staff includes a forest economist, Mr. V. L. Sexton, who has been proposed as a member of the Society of American Foresters by the Portland chapter.

W. T. ELLIS, JR., EXECUTIVE DIRECTOR,
TENNESSEE STATE PLANNING COM-
MISSION, NASHVILLE, TENN.

In reply to your letter of April 5th, I wish to express my agreement as to the importance of giving forestry proper consideration. We do not retain a forestry consultant, but we do work very closely with the State Department of Conservation, and, in so doing, receive the advice of the State Forester.

R. K. TIFFANY, EXECUTIVE OFFICER,
WASHINGTON STATE PLANNING
COUNCIL, OLYMPIA, WASH.

This to thank you for your letter of April 5th pointing out the fine work of the forester in land use planning and suggesting that a representative of the forestry profession should be included in the membership of state planning boards.

The suggestion is perhaps a sound one but not applicable here for the present at least, since our planning board is made up of citizens appointed at large by the Governor, removable only for cause and serving six year terms. Governor Martin has deemed it wise at the expiration of the shorter terms to reappoint the incumbents, who have been working zealously and unselfishly for three years.

We are very happy to have working in intimate cooperation a very large group keenly interested in forestry, including professional foresters and others connected with the industry or with public administration of forest lands. One of our chief objectives during the past year was the preparation in preliminary form of "A Master Plan for Forestry," a copy of which is sent to you under separate cover. Another study involving land use planning and forestry on a large scale was made in connection with the proposed Mount Olympus National Park, and a copy of the report in this connection is included.

I am now advocating an intensive study of all publicly owned lands in the state—state, federal, county and municipal—with a view to determining the highest and best use of the various holdings, acquisition policies, study of multiple uses, administration, etc. We feel that it is not in the public interest that the administrative control and land use policies to prevail in this or any other public land state should be determined as the result of a cat and dog fight between two federal bureaus, even though the ownership of the greater portion of the land in question is in the federal government.

M. S. DODD, PLANNING ENGINEER, NE-
BRASKA STATE PLANNING BOARD,
LINCOLN, NEB.

Your letter of recent date addressed to Mr. A. C. Tilley, Chairman of the Nebraska State Planning Board, has been referred to this office for consideration and reply.

I am happy to be able to inform you that our present board now includes in its membership one individual who has been active in the forestry field for a number of years and who is, no doubt, well known to some of your members. The man to whom I refer is Dr. G. E. Condra, Director of the Division of Conservation and Survey of the University of Nebraska at Lincoln, Nebraska.

The Nebraska State Planning Board has not, as yet, made the study of forestation a major activity, although the importance of such a study was recognized at the time of our original program of studies was formulated and adopted by the Board a little more than a year ago. The smallness of our staff has made it impossible to undertake such a study until other pressing needs were taken care of. We have, however, given some consideration to the need for and desirability of a more widespread distribu-

tion of various types of tree plantings in the state in connection with our recent study of water resources and the Board has made recommendations favoring such development.

I am heartily in accord with your recommendation that each State Planning Board should include within its membership at least one representative of the profession of forestry and I hope that your efforts in this direction will be successful.

FREDERICK P. CLARK, PLANNING DIRECTOR,
NEW HAMPSHIRE STATE PLANNING AND DEVELOPMENT COMMISSION,
CONCORD, N. H.

This will acknowledge your recent let-

ter transmitting a resolution, approved by the Executive Council of your Society, to the effect that a forester be included on the membership of all state planning boards and that a forestry consultant be employed.

I wish to advise you that the policy of this Board is to use the expert advice, not only of foresters, but of all other professions. The act establishing this Commission also established an advisory board comprising all department heads, one of which is the state forester.

The Forest Supervisor of the White Mountain National Forest and the Extension Forester of the State Extension Service are also included on the membership of our advisory committee relating to forestry problems.



U. S. FOREST SERVICE NURSERY PRODUCTION

DURING 1936 more than 237,500,000 tree seedlings were produced by 15 U. S. Forest Service nurseries located in 11 states. The production included those furnished cooperating agencies, as well as the 215,000,000 trees planted on National Forests.

Michigan Forest Service nurseries led in output. The Chittenden nursery, the largest in the country, produced 57,667,000 trees. Wisconsin's Hugo Sauer nursery produced nearly 25,000,000. The Stuart nursery in Louisiana reported production of nearly 30,000,000, and the newly established W. W. Ashe nursery in Mississippi produced 22,000,000.

In addition to those used on National Forest reforestation projects, trees were shipped from the Forest Service nurseries to federal and state agencies for planting on state forests, resettlement projects, Army and Navy reservations, and other co-operative projects.

CHARLES LATHROP PACK

1857-1937

By TOM GILL

WHEN Charles Lathrop Pack died on June 14, the Society of American Foresters lost a distinguished Honorary Member, and the cause of forest education was bereft of a loyal champion.

The lumberman son of a lumberman father, Mr. Pack was born in Lexington, Mich., May 7, 1857, educated in Cleveland, Ohio, and as a young man became interested in forestry while in the Black Forest of Germany. When the first Governors' Conference took place at the White House in 1907, President Theodore Roosevelt invited him to attend as a conservation expert, and later made him one of the National Conservation Commissioners. In 1913 he was elected President of the National Conservation Congress and re-elected the following year. From 1916 until 1922 he served as President of the American Forestry Association.

In that year Mr. Pack and his son, Arthur Newton Pack, organized the American Tree Association. Its primary purpose was to encourage people to plant trees and to broadly popularize forestry on a national scale. Soon the American Tree Association began issuing a small paper booklet entitled "The Forestry Primer", explaining in simple and direct language the economic importance of forests and the dangers of forest destruction. This Primer was distributed free to tree planters and to schools, a distribution that has reached nearly five million copies.

To insure the permanence of his educational work, Mr. Pack established a substantial trust fund with the definite purpose of building an enlightened forest consciousness on the part of the public.

He created demonstration forests at Yale, Cornell, Washington, and Michigan Universities and the N. Y. State College of Forestry at Syracuse; provided numerous scholarships in forestry; and endowed twelve colleges with funds to award annual prizes for essays and articles on forestry.

His interest in forestry was not confined to the United States. In 1920 he contributed American tree seeds to reforest the war-devastated areas of France and Belgium, and in following years sent further consignments to Italy and Great Britain. In 1927 he financed a three-year fact-finding survey of the tropical forests of the Caribbean.

With forestry attaining an ever-widening public recognition, Mr. Pack started the publication of a magazine known as the *Forestry News Digest*. It is distributed free to all foresters and other interested persons who wish to keep in touch with current forestry developments. This soon obtained a wide circulation, reaching an average 55,000 copies per issue.

So far his work had been concentrated on mass education in forestry—in popularization—but now, the better to promote its more purely scientific and professional phases, he established in 1929 the Charles Lathrop Pack Forest Education Board to award fellowships to foresters and potential foresters showing promise of exceptional ability. This Board is today made up of leading foresters and forest educators in America. More than forty fellowships have been awarded, and the success of the plan is testified to by men who have held these fellowships and are already beginning to take prominent places

in forest economics and other branches of the forestry profession.

The following year the Charles Lathrop Pack Forestry Foundation was established to forward the social-economic goals of forestry through special educational projects. Under this Foundation the publication of numerous books and pamphlets on forestry has been made possible, and studies undertaken on selective logging and other problems.

Two more Foundations followed. At Yale University a Foundation was established to study eastern and southern for-

estry problems relating to small land ownership, and another Foundation at the University of Michigan was created in memory of Mr. Pack's own father, George Willis Pack.

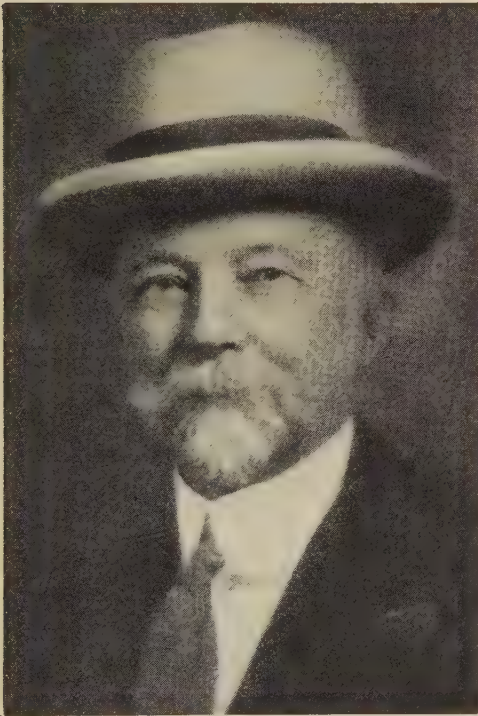
Mr. Pack had many interests, but the cause of forestry lay nearest his heart. His death puts an end to a life of pioneering in the field of forest education. His work was predicated on an unswerving faith in the fundamental importance of the productivity of the soil. "All wealth comes from the soil," he once told his old friend, John Hays Hammond. "The people of America must be made to realize this. They must save the soil and perpetuate the wealth the soil produces." It was to drive home this fact that Mr. Pack gave so liberally of his time, his energies, and his fortune.

Forestry education, in its most intensive and most extensive forms—that was the dual goal for which he strove. Extensive education of the public on a nation-wide scale, intensive education within the profession itself. His ultimate hope was to bring higher attainments and broader horizons to the entire forestry profession, and at the same time advance popular education by increasing the awareness of each citizen to the needs of forestry.

His passing leaves a void among the thinning ranks of the Old Guard of Forestry—the Old Guard that has made imperishable history and fought so valiantly in the liberation war for forestry.

Mr. Pack will rest beneath the shadows of his well beloved pines on the Warrensburg demonstration forest beside the Hudson.

It is a spot of his own choosing.



CHARLES LATHROP PACK

THE AUSTIN CARY MEMORIAL

By H. S. NEWINS

Austin Cary Memorial Committee

A little over a year ago the Society of American Foresters lost through death one of its most distinguished members. Because of his outstanding contributions, both to the Society and to American forestry, it is fitting that a memorial should be erected by his colleagues and friends in grateful appreciation of his services. In the following article Prof. H. S. Newins, Chairman of the Austin Cary Memorial Committee, outlines the contemplated program of his committee. This is followed by a brief description of the memorial plan by W. H. Reinsmith, U. S. Forest Service. It is certain that the memorial committee program will be supported broadly and generously by the members of the Society.

THE late Dr. Austin Cary was stricken with heart disease April 28, 1936 during a visit to the campus of the University of Florida. Because of his prominence in the forestry profession and among the wood-using industries, his estate received many personal condolences and much recognition in the forestry press and lumber trade journals. Subsequent to his death the estate, consisting of his brother, George F. Cary, donated to the University of Florida all his notes and working tools located within Florida to be known as the "Austin Cary Memorial Notes". This portfolio has since been increased by the addition of all the ensuing correspondence. The Florida State Board of Control fittingly named the University Forest of 1,519 acres, the Austin Cary Memorial Forest, as a tribute to so eminent a forestry authority as was Dr. Cary. This forest is of the flatwoods type located within the heart of the slash pine belt along state highway 13 and the Seaboard Air Line Railroad, ten miles from Gainesville and between Fairbanks and Waldo.

At the December 1936 annual meeting of the Society of American Foresters in Portland, Oreg., it was voted to have a memorial representing the Society of American Foresters and friends in memory of Dr. Cary, who, since 1924, had been one of the ten Fellows in this Society of more than 3,900 members. The

Southeastern Section of the Society had previously investigated through a committee various sites for a memorial and, based upon their report, the Society selected the entrance to the Austin Cary Memorial Forest, mentioned above.

President Chapman of the Society appointed the following executive memorial committee: C. H. Coulter, Tallahassee, Fla.; Ernest F. Jones, Bangor, Maine; A. B. Hastings, Washington, D. C.; A. E. Wackerman, New Orleans, La.; John B. Woods, Washington, D. C., and H. S. Newins, Gainesville, Fla., with the latter as chairman. Subsequently, President Chapman added to the executive committee other names as various Sections made such requests. This committee, acting upon the request of President Chapman, now submits a progress report in order that the entire membership of the Society and also the friends of the late Dr. Cary may become better acquainted with the plan adopted by the Committee. The plan, with comments by W. H. Reinsmith, landscape architect, is included herewith and was prepared by himself through the courtesy of the Regional office of the U. S. Forest Service, Atlanta, Ga. The Committee after much correspondence has approved the final plan as submitted and is developing it detail by detail in so far as funds, which are being subscribed, will permit. The estate, as represented by Mr. and Mrs. George F. Cary, who have re-

cently visited the site and inspected the present development, has expressed approval of the plan in its entirety, as have also those members and officers of the Society, including Executive Secretary Henry Clepper, who have inspected the preliminary work already accomplished upon the ground. They all feel that the plan is simple and in keeping with the character and pursuits of the man to whom we seek to pay silent tribute by a memorial within the fastness of the very forest in which he found solace and retirement in the last years of his life.

The funds which are now being donated by the Society and the friends of the estate are being expended first on the memorial granite boulder and plaque and the grove of 71 slash pines as featured in the plan. The inscription for the plaque was prepared by T. A. Liefeld, of the Southern Forest Experiment Station, Olustee, Fla., while acting as a member of the original Cary Memorial Committee of the Southeastern Section of the Society, and is as follows:

—1865—DR. AUSTIN CARY—1936—

"The Society of American Foresters and friends of Dr. Austin Cary have erected this memorial in deep appreciation of his unending interest and effort toward the promotion of sound forestry practices in the United States."

The Committee desires to express the appreciation of the Society of American Foresters to the many cooperating agencies assisting in the development of this memorial, including the public and private forestry groups, the Florida State Road Department, the Seaboard Air Line Railroad, and the University of Florida including the School of Architecture and Allied Arts. The Works Progress Administration, in their state-wide Project of Forest Fire Protection and Education, has already developed the entrance to the Austin Cary Memorial Forest in cooperation with the above mentioned organiza-

tions to the extent that the state highway fill and culvert and the railroad crossing have been completed and the fence work is being rapidly carried forward including details for masonry and cattle guard. The memorial itself is located within the forest and includes the features detailed by Mr. Reinsmith and approved by the Committee. All funds collected by the Committee are submitted to the Washington Office of the Society of American Foresters to insure an accurate accounting and the names of those subscribing and the amounts thereof are confidentially recorded by the Committee for fiscal accounting and are not for any publicity whatsoever. There will be no inscriptions of the names of committeemen or other persons; only the simple plaque inscription referred to above. The Committee desires, however, to secure as many individual subscriptions as possible of any amount large or small in order to make this memorial as truly representative of the profession and friends as may be possible. An enlarged photograph of Dr. Cary suitable for framing will be forwarded to each contributor requesting it.

It will be noted by the plan which the Committee has adopted that step by step the memorial scheme will be completed as the funds contributed will permit. There is nothing either ornate or spectacular about any feature, but rather the plan in its natural setting is in just such simplicity and harmony as the estate of Dr. Cary desires. The granite boulder from the vicinity of Dr. Cary's birthplace at East Machias, Maine, is an expression of tribute noteworthy in the South where Dr. Cary spent the last years of his professional career, and the contribution of the outstanding plan of the memorial, which is donated and supervised in its erection by the U. S. Forest Service, is a tribute from his fellow workers in the U. S. Department of Agriculture where Dr. Cary was active until his honorable retirement in 1935. Contributions which

typify the influence of Dr. Cary are being received from New England, the Lake States, and the Pacific Coast as well as from the South and other regions. Perhaps the most significant of the expressions of reverence are from those persons interested in private forestry who received their initial encouragement in this field through the untiring efforts of Dr. Cary.

This Memorial through its location upon the demonstration forest of the University of Florida is secure from the usual hazards of fire and of vandalism. The management of the demonstration forest is founded upon the principles of "dirt forestry" emulated by Dr. Cary, and will pay real dividends above the cost of adequate fire protection and carrying charges. Thus the University of Florida is prepared to assume the role of protector of the Memorial in perpetuity for all of the varying interests of federal, state, and private forest agencies and persons interested therein. The Committee will of course desire to maintain a separate fund for maintenance, but the Uni-

versity is prepared to include the Memorial under the observation of the Demonstration Forest caretaker.

The executive members and the enlarged committee desire to receive any appropriate suggestions from the readers of the JOURNAL as to the completion of this Memorial, but are equally anxious to adhere to the accepted plan which is already underway with the supervision of Regional Office 8 of the U. S. Forest Service and of the Florida Forest and Park Service. There is a real need now for the subscriptions of any amount, large or small, which will make this Memorial truly representative of the Society membership and of the many friends who want to participate. Donations are being received by the Committee through Section officers and these funds are duly acknowledged by the Committee and recorded at the Washington, D. C., Office of the Society of American Foresters, Mills Building, 17th and Pennsylvania Ave., N. W. Send your contributions at once.

THE PLAN FOR THE AUSTIN CARY MEMORIAL

By W. H. REINSMITH¹

U. S. Forest Service

IT IS proposed to make readily accessible to interested people and to travelers in general the one memorial to the memory of the late Dr. Austin Cary which is to be established in Florida on this site in accordance with the desires of the Society of American Foresters. Consequently the entrance from the highway is made frank and easy to recognize by the device of simple entrance roadway and gibbet signs shown on the plan. Incentive for motorists to slow down and

enter the grounds is to be provided by suitable signs at strategic points along the two-mile highway frontage of the Austin Cary Memorial Forest.

At the point of entrance the forest is to present a wide open sector converging to a focal point inside the grounds and across this wide funnel-form opening is to be spread the entrance way, sufficiently impressive, but simple and low enough to permit vision well into the opening from the highway. This is made espe-

¹Landscape architect, Southern Region, Atlanta, Georgia.

cially necessary by the intervention of the railroad tracks between the highway and the Memorial grounds.

The movement of traffic inside the gateway is first toward the left of the main axis then swinging on a reverse curve to the right until the ensemble is presented forcefully and at closer range on another axis, on which the principal elements in the Memorial are balanced. Beyond this point the movement is to the right around the loop road with the parking spaces so arranged as to make parking easy, logical, and convenient to the objective elements of the plan. While the general movement of traffic is to the right on the one-way road, there is also provided a double width road to the left of the Memorial, to the gate through which a simple woods road leads to the other parts of the forest.

The elements of the Memorial are the following:

1. A memorial plaque mounted on a granite boulder from Dr. Cary's birthplace in Maine which is to be set up on a pedestal in the midst of a platform of coqunia flagging, the outline of which follows the shape of the official Forest Service shield symbolizing Dr. Cary's long association with forestry.

2. A memorial grove consisting of 71 slash pine trees; the number to represent Dr. Cary's age when he died and the species to emphasize Dr. Cary's intensive interest and his accomplishments in naval stores, pulpwood, and timber production.

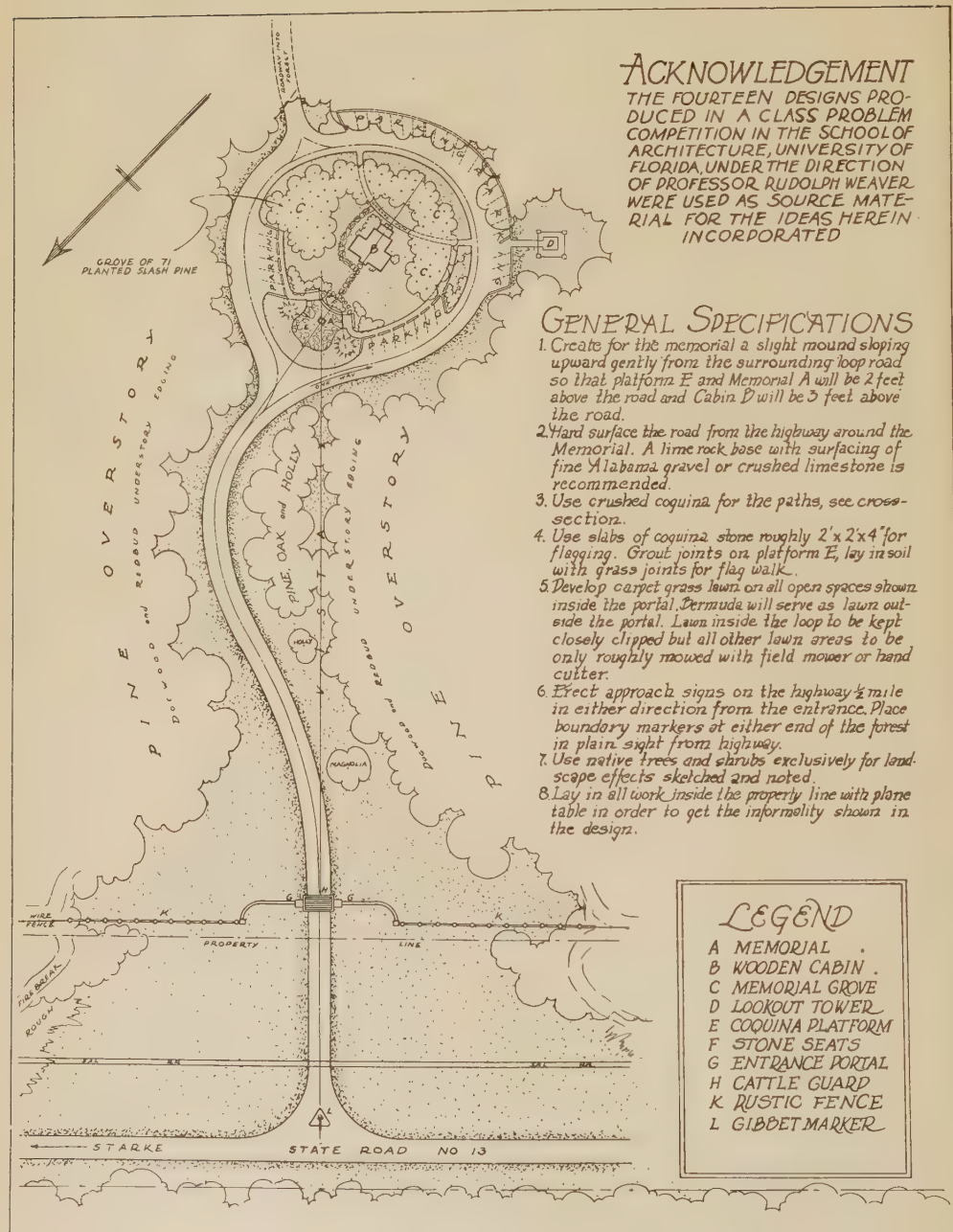
3. A wooden building, a simple cabin really, to house and display Dr. Cary's works, field instruments, and other interesting objects associated with his activities, all of which mementos are in the possession of the Committee.

4. A fire lookout tower to symbolize forest protection and incidentally to serve in the protection plan for the forest.

An attempt has been made to combine these elements pleasingly in a design which incorporates compactness made necessary by limited high ground available and by necessity for economy of maintenance. Native materials are to be used throughout to blend with the forest surroundings and give an atmosphere of the simplicity so characteristic of Dr. Cary. The structures and devices and their component materials specified in the plan all have been used and tested in other landscape projects of a forest character in the South and their introduction here will not be experimental.

For the sake of impressiveness, durability and economy in the long run the best in materials is essential and hard gravel-surfaced roads and coqunia paths are specified. There is need for a structure in which to keep safely Dr. Cary's records and relics, and nothing seems as appropriate as a wooden cabin, in the construction of which various species of wood can be utilized in various ways. Native field stone is preferred for the entrance portal, and it is urged that only native plantings, most of which can be obtained in the immediate vicinity, be used for landscaping effects. The lawn areas and field grass areas are to be of carpet grass, in order further to carry out this feeling.

It is felt that this plan offers a simple yet effective solution to the problem of tying in the above-described elements into one unified scheme which, it is calculated, will work very smoothly in actual use without the necessity for attendants or admonitory signs.



Prepared courtesy U. S. Forest Service

Fig. 1.—Plan of Austin Cary Memorial, Gainesville, Fla.



Fig. 2.—Perspective of Memorial.

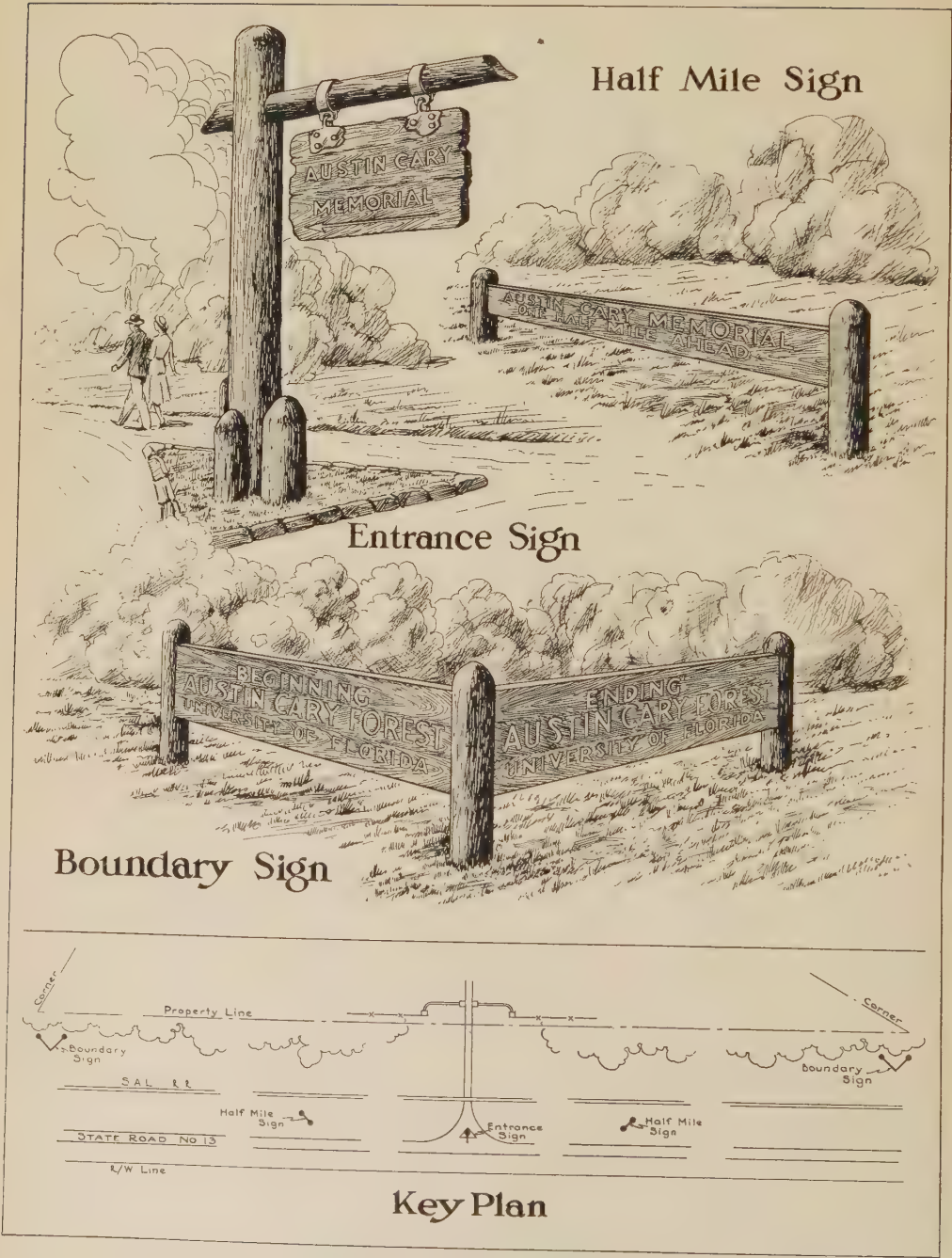


Fig. 3.—Signs for Austin Cary Memorial.

FOREST INDUSTRY WILL DO ITS PART¹

By W. B. GREELEY

FOREST Industry is in transition from the old order to the new. It is gradually changing its methods and its thinking from the old viewpoint of timber as a MINE to the newer viewpoint of timber as a CROP. Forest industry seeks to adjust its up-bringing in laissez-faire economics to the public interest now recognized as inherent in natural resources. It honestly wants to find common ground on which the obligations of responsible men to the investments in their trust can meet legitimate interests of public welfare.

Forest industry welcomes the new order of reforestation, sustained yield of timber, stable employment and social security. But, as practical men, we must deal with realities. Real obstacles must be overcome. Commercial forestry must pay its way. This is not possible without public support. And we believe that public responsibility goes hand in hand with the public interest so vigorously asserted in the forest land problem. Recognition of mutual public and industrial responsibility is the master formula for working out the forest problem, widely recognized by conservation leaders and in forest legislation. In its light, we offer a brief review of forest industry in this day of change.

The colorful background of forest industry goes back to the days of free timber. Free timber had the same grip upon men's imagination as free land or placer gold in the California Sierras. It cast the mold of forest industry for many decades. Aggressive men, seeking wealth, moved into one virgin forest area of vast extent after another—into the North woods of the Great Lakes; into the Southern pineries and the vast hardwood forests of the Mississippi Valley; into the all but limitless softwood forests west of the Great Plains. They were led on by a constantly advancing horizon of free timber. With each decade,

they developed more efficient machinery for timber conversion, greater skill in mass production. They created more powerful logging machines; bigger and better sawmills; larger forest properties, and larger bond issues. They gave the country incomparably cheap lumber. These were the years of still active settlement, of the building of new communities and new farmsteads. The national and per capita consumption of lumber grew beyond anything known in the history of the world. And for years we went through a rising spiral of increasing lumber production, increasing lumber use, more and bigger sawmills, larger investments in forest industry.

The plentiful supply of virgin forests, the inevitable speculation in timber, the financing of large properties, and the yearly property tax, turned the financial thinking of lumbermen to quick realization. To many operators, a section of virgin timber was a mine, to be worked out and left behind for new diggings. Timber investments rested largely on the business philosophy of liquidation; or, if you please "cut out and get out." In the earlier years, settlers often crowded upon the heels of lumbermen, and afforded a market for their cut-over land.

And so forest industry rolled on to the Pacific. It was well typified by its mythical hero . . . Paul Bunyan. Logging camp legend credits the mighty Paul with deciding that the scope of the new country and the size of its timber required a bigger and better mill pond. So forthwith he dug Puget Sound.

It may be observed that, in their pioneer history, lumbermen were no better and no worse than their countrymen who in like fashion acquired and exploited the other natural resources of the land,—its agricultural soils, its stock ranges, its minerals.

¹Presented before the Forest Conservation Conference, April 7-9, 1937, Washington, D. C.

It was in the spirit of the times, a natural outflow of aggressive men playing the game in accordance with the rules of the game.

It may also be observed that men conserve that which has value; that the conservation of anything excessively abundant and cheap is an antithesis in its own terms. It was inevitable that a very substantial reduction in the virgin forests of the United States had to take place before any economic footing for timber culture could exist. Forestry does not go with free timber; any more than scientific agriculture goes with free land.

But for forest use as to the use of other natural resources came the day of reckoning. The studies of timber supply, the forecasts of timber shortage, the forest conservation movement, the creation of National Forests and State Forests, the awakened consciousness of the public and industry alike to the destructiveness of forest fires, the research in scientific timber culture and in timber utilization, the assertion of an aggressive public interest in the use of forest land—these all came in their appointed time. They have taken a powerful and constructive part in turning the exploiting, impermanent stage of forest use toward timber culture and permanence.

The viewpoint of forest industry toward conservation has materially changed during the past twenty years. This change is progressively going on.

It is due partly to the slowing up and settling down of the migratory elements of the industry, as new virgin territory became more limited and second growth forests became definite and tangible sources of supply.

It is due in no small measure to the educational impress of the conservation movement, to the results of forest research and to the demonstrations of conservation practices on public forests. And the industry has always had good examples of its own. In the Northeastern states, especially Northern New England, a combination of favorable forest types, favorable climate

and people of conservative temper in dealing with their land has resulted in successive timber cuttings, extending through several generations, which have maintained forest areas and forest growth substantially unimpaired. In other regions, there have been many instances of forest owners who, because of their type of product of interest in reforestation, have tried out methods of partial cutting and given their neighbors demonstrations of forest lands kept practically in continuous production. As the surge into new virgin fields spent itself and the industry dug in, it found in its own experience and local leadership, as well as in the admirable work of public forest agencies, the basis on which to start anew.

A striking early development in forest conservation, running through most regions of extensive commercial ownership, was the forest fire protective association, an agency in which owners join for organized protection from forest fire. "Keeping fire out of the woods," in our great areas of coniferous forests, is—in itself—probably two-thirds of reforestation. The wide-scale organization of forest owners for protection, beginning early in the present century, is one of the most constructive chapters in our forest history. It was greatly aided by the Federal policy of cooperative protection, expressed first in the Weeks Act of 1911 and still more completely in the Clarke-McNary Act of 1925. And the protective associations, in their turn, have contributed powerfully to State legislation extending to all forest lands protection methods and division of costs set up in the beginning through the voluntary action of forest owners. The yearly expenditures of private forest owners in the United States for protection from fire now exceed \$2,500,000.

The increasing support of forestry throughout the industry found a definite point of focus in the National Conservation Conference of 1933 which, for the first time in our history, drafted a forest

code for industry. Lumbermen assumed an obligation to protect their lands from fire, during and after logging; and, through seed trees, uncut small timber, selective logging or whatever method was best adapted to the forest and site, to leave cut-over areas in good condition for regrowth. Rules of forest practice were adopted in each regional division of the industry. Trained foresters were employed by the Code administrators to enforce these rules by inspection of logging operations. The woods knowledge of the whole industry was focused upon ways and means to make good under the obligation assumed by the Code.

When the death-knell of NRA was rung, most of the divisions of the lumber industry undertook to carry on, through their Trade Associations and as a voluntary effort, the same conservation practices which had been adopted under the Code. A year ago, the Directors of the National Lumber Manufacturers Association adopted a resolution which contains these words:

"We believe that forest industry should accept the responsibility and obligation to cut and protect their forest lands so as to provide for regrowth.

"We accept the continuous production, or sustained yield, of forest resources as the ultimate objective of our industry. To hasten the attainment of this objective, we urge effective cooperation by State and Federal agencies."

In the Pacific Northwest, where I live, the great bulk of forest lands are being cut today under effective rules of fire prevention and reforestation developed from the practical experience of our operators and foresters. Cut-over lands are largely free of the greatest of our continuing fire hazards, the standing dead tree or snag. When the Association sends out telegrams warning of exceptionally hazardous fire weather, the logging operations shut down. Various methods of leaving seed trees or seed blocks or staggered cuttings or selective logging insure reseedling of the greater part of the cut-over lands. We are still far from a finished timber culture; but we are definitely on the way.

Representatives of forest industry are

here in Washington now to take fresh stock of what the industry is doing and failing to do in forest conservation; and to recommend what public agencies should do—to carry on where the industry must leave off.

I do not want to over-paint a picture of changing attitude by forest industry toward conservation; or to gloss over its many imperfections. The main thing is that a new point of view toward their natural resource is making headway among lumbermen. It is one of those gradual, evolutionary changes in men's thinking, still far from universal but general enough to represent a definite trend in industrial viewpoint. At the bottom of it is a growing recognition of the public interest in forests and their use; and a growing effort to adapt the practices of the industry to the reasonable requirements of public welfare.

The definite trend in forest industry today, as an obligation of good citizenship, is to leave its cut-over lands in good condition for regrowth. Beyond that, the industry knows that the management of forest lands for planned future production, or sustained yield, is coming; that the old regime of "cut-out and liquidate" will give place to permanency in forest ownership, in forest-borne communities, in forest supported labor. A number of owners have already put their forest properties in continuous production and are doing their best to carry out the whole program. The industry generally wants to progress in the same direction.

The barriers to sustained yield of timber—for many owners and for some forest regions—are real. Many of them are wholly beyond the power of industry to remove. Because we hold that forestry as a national undertaking must be a joint enterprise of industry and the public, we believe an obligation rests upon the public to do its part in removing these barriers.

They may be stated in the simple truth that sustained yield from forest land re-

quires a sustained market for forest products and a sustained return to the forest owner that enables him to stay in business. Security for communities and labor, based upon permanent forest enterprises, must rest upon economic security for the enterprises themselves.

In a nut-shell, our problem is this. On one hand, our area of forest land and our volume of forest growth are increasing. On the other hand, our consumption of forest products at home has drastically decreased and our market for forest products abroad has been cut down by more than one-half.

Twenty years ago, the question before the house was: "How can the United States be adequately supplied with timber?" Today, the question has become: "How can our expanding acres of forest land be profitably employed?"

Let us look at the facts as compiled by the National Recovery Administration one year ago. Of the original forest area in the United States, there remains 495 million acres in timber, second growth, land restocking with trees or land denuded of trees by logging or fire and not converted to other use. This is all real timber growing land. It does not include either reservations for parks or the large areas of alpine and semi-arid woodlands unfit for commercial forestry. Nor does it include the extensive forests of Alaska.

The clearing of forest land for farms is practically over. Land is now moving back from tillage into forest. Beyond the half billion acres of original forest land still remaining, some 52 million acres of abandoned farm land is reverting to forest; and 25 million acres more of sub-marginal farms are expected to revert to forest. The United States is becoming *more* of a forested country—not less.

From the same source, we find that the average drain upon our forests, from all uses and from fire and other natural causes, during the period of 1929 to 1934, only

slightly exceeded the present timber growth or forest crops.

Nearly one-fifth of the present drain is caused by forest fires, insects, tree disease and storms. If the current loss from these sources, much of which is preventable, could only be cut in two, the present forest crop of the United States would fully supply *timber use and timber markets*, at the rate of consumption from 1929 to 1934.

Note the next significant figure. With better forestry, under known methods adapted to the different regions and tree species, our present timber crop can be increased nearly two and one-half times. That is to say in broad terms, when sustained yield is applied to all the present commercial forests of the United States, we must support it with a consumption of forest products—at home or abroad—about two and a half times the consumption of today.

This brief summation makes no attempt to deal with the differing situations of timber supply in different parts of the United States, or the regional deficiencies in some cases as contrasted with regional surpluses in other instances. It strikes a balance in the national forest budget—in order to put the broad picture before you. The meaning of the broad picture is this:

Sustained timber culture cannot be brought about on one-fourth of the soil of the United States, unless forestry in land use is backed up by forestry in marketing and economics. We cannot grow what we cannot sell. We need an American policy that is forest-minded all the way through. We need the same national attitude toward forests as toward other soil crops.

This lesson was learned by the leading forest countries of Europe generations ago. In France, Germany and Sweden, the security of domestic forest industries and domestic timber values is just as deeply entrenched in public policy as the system of land usage and control. Economic security is the basis of their conservation.

What of the Security of Forest Industry in the United States?

The booklet on your tables, entitled "Charting the American Lumber Industry," contains many vital facts which show the insecurity and instability of this leading forest industry. They tell why many lumbermen are still bent upon liquidating the forest investments they now have and shy away from further investment projected into a long future of sustained yield.

Page 10 carries a twenty years' record of Net Income and Deficit in the Lumber Industry, based upon Income Tax Returns to the Treasury Department. It brings out vividly the tremendous drain upon the capital and credit resources of the industry during the years of low volume business since 1929.

Page 12 traces the Ups and Downs of lumber production since the peak of 30 years ago. The total cut of all species of lumber in 1936 was approximately 23 billion feet as compared with 46 billion in 1906, and 37 billion in the years just preceding the depression.

Page 13 brings home the effect of declining lumber markets upon the industry's investment in manufacturing plants. It shows the proportion of installed saw-mill capacity actually employed during the last 30 odd years: 83 per cent at the peak of 1909; 69 per cent just before the depression; 19 per cent in the bottom year of 1932; a recovery to 44 per cent in 1936.

These facts aid to an understanding of the financial thinking prevalent in forest industry. "Cut-out and Get-out" is bad public policy; but it is based upon the cold facts of experience.

Other factors of saw-mill capacity have an important bearing upon our problem of forest stabilization. The larger enterprises, representing roughly two-thirds of the industry, must carry fixed investments over long periods in timber and conversion facilities. Unlike most industries, these factories must own, service and protect their own supplies of raw material for

years ahead. The sheer necessities of a sound business structure compel as nearly continuous operation as the market permits, often more than the lumber market justifies. That is why, in the past years of declining lumber consumption, the industry has been notoriously handicapped in adjusting supply to demand and in realizing enough to pay its wages and taxes, carry its investments and return the cost of its timber.

On the other hand, *Lumber production is well nigh as widely distributed as agriculture. It is an industry of proportions in 38 states.* A saw-mill, of a sort, may be built with a few thousand, even a few hundred dollars; and start business on a farm wood lot or a few acres of second growth timber. There are thousands of such little mills in the eastern states, with investments proportionately much smaller than their larger competitors. They come into production on a rising lumber market and drop out when the going is hard. Numbers of similar little plants are now appearing in the West.

Hence, the aggregate saw-mill capacity of the United States tends to remain about the same from one decade to another. For every large mill which cuts out, a dozen little mills come in. This in itself points to a large extent of the present regrowth of timber; and it shows that the control of lumber production has much in common with the control of agricultural production.

Perhaps the key chart in this clinic on the lumber industry is that given on page 16 of our exhibit, "The Per Capita Consumption of Lumber in the United States." Passing by the years of extreme depression and their almost total suspension of private building, we had in 1936 a per capita consumption of 176 board feet. It was 523 feet in the peak of lumber use; about 300 feet during the last period of active building before the depression.

The decrease of over 40 per cent in per capita use of lumber in twenty years of

relative prosperity and active construction, before depression came, puts in a nut-shell the toughest problem of lumber. It is a summation of the changes in national building habits as our population has become less rural and more urban and of the aggressive invasion of old lumber uses by many other materials.

This sharp contraction in the domestic lumber market, in part doubtless inevitable, in part attributable to deficiencies in industrial research and merchandising, is something to ponder over as we construct a national policy which seeks to keep one-fourth of the soil of the United States in continuous timber culture.

I will burden you with but one more reference to the Lumber Charts. Page 37 tells the sad and graphic story of the loss of over 60 per cent of our former lumber trade with foreign countries. The pages following depict how the tightening down of export markets has reduced lumber shipments from nearly every forest region in the United States—especially those from the Southern Pineries and from the Pacific Northwest.

In 1928 and for many previous years, the United States led the world in international lumber trade. We supplied 20 per cent of its total volume.

Today we have dropped to fifth place and cut our share in the world's lumber market by one-half. Russia has taken our old position as Number One, followed by Finland, Sweden and Canada. This loss of economic support for American forestry is due in small part only to disadvantages inherent in our industry or in our timber. It results primarily from discriminatory tariffs imposed upon our products abroad; and particularly from the preferential tariffs set up within the British Empire. Obviously this phase of forest conservation rests in the lap of Federal policy.

With these lumber balance sheets before us, what may reasonably be asked of an American policy that is forest-minded all the way through?

We do not think that government should "buy out" the forest problem by nationalization of forest industry or wholesale nationalization of forest land. We believe rather that American policy should leave to private initiative all the land on which it is capable of stable ownership and good forest practice.

A material expansion in Federal and State Forests is required, however, to place under stable management surplus holdings of old timber in the West, now threatened with forced liquidation; unstable and shifting areas of second growth timber in the East, now in the course of premature cutting; and tax delinquent land or timber now without responsible ownership or care. Extension of State or Federal ownerships in such areas will not only bring back into productive forests some lands now idle. It will go far in checking demoralizing attempts to liquidate timber, in stabilizing forest values, and in creating confidence in forestry as a field for private investment. I would make the aim of public acquisition—not to set up the States and Nation as forest proprietors, but to set up a stable foundation of forest values for all owners whereupon sustained production can soundly be built. That is to say public ownership should not seek to replace industrial forestry, but extend it and make it more secure. This, of course, implies no limitation upon the public acquirement of lands needed for such other purposes as control of floods or soil erosion.

The availability of public forest lands is often an important factor in the situations of forest owners or community groups of forest industries in working out a sustained production for their operations. Where practicable and without detriment to other interests, the correlated management of adjacent public and private timber lands is a means for wider application of the sustained yield principle.

We believe that all forests in public ownership or control, should be placed under a sustained yield plan of use. We also

advocate that public forest administrators be authorized to undertake joint, or cooperative, plans of sustained yield with nearby owners or industries, under proper contractual safeguards. This in the interest of getting more forest acres in continuous production in the shortest time.

As a further means of checking liquidation and creating confidence in forest enterprise, there is need for a federal system of Forest Credits, similar to the measure now under consideration. It should make available to forest owners who undertake sustained yield, long-term loans at their cost to the government for principal and service. Such credits would help materially in changing over the financial structure of forest industry to a more permanent footing.

In two other respects, the economic structure of American forestry must be strengthened at its base. Many years ago, a wise Congressman from Minnesota summed up forestry as "keeping the fires out and the taxes down."

The United States has gone a long ways in "keeping the fires out" under the constructive policy written into the Clarke-McNary Act. More clearly, perhaps, than any other public enactment, that law sets forth the principle of joint public and industry responsibility in forestry, which should be our master formula in attacking all of these problems.

But we still have far to go in this obvious job of forest protection. No more evidence is needed than the glaring fact that nearly one-fifth of the total yearly drain upon the forests of the country is not in cutting for lumber, pulp wood or other products, but in loss from fire, insects, and tree disease.

Accumulating evidence also demonstrates how clearly the forest fires problem is a public problem; how helpless is the forest owner in protecting his lands without vigorous support in public organization, state police power and popular sentiment. The latest forest fire record for the en-

tire United States (1934), covering 465 million acres under protection, reveals that lumbering caused 1.3 per cent of all the fires, and less than 3 per cent of the entire acreage burned. Lightning was responsible for 9 per cent of the fires, and incendiarism for 25 per cent. Thirty per cent were due directly to public use of forest lands.

While many states have strengthened their Forest Codes and their protective organizations; while a majority of forest owners are doing a constantly better job in providing fire prevention equipment, disposing of slashings and other hazards, and closing down when weather is dangerous; the funds available for Federal cooperation under the Clarke-McNary Act have sadly lagged.

We ask an American policy that is forest-minded all the way to carry through the protection of forest growth and forest investments, not only from fire but from the other destructive agencies which are equally beyond the power of an individual land owner to stop.

I will dip into the old problem of forest taxation for just a moment. The annual property tax on standing timber, while moderately applied in some localities, remains, in the words of the National Recovery Administration:

"One of the most important single factors in stimulating the sale or cutting of timber, and proportionally influencing the manufacture of forest products without due regard to current market demand. Upon the solution of this problem substantially depends the present and future security of ownership of privately owned timber as well as the maintenance of reasonable balance between production and consumption."

There is no apparent answer to a system of timber taxation, which is destructive to stable forest ownership and sustained yield, except through State legislation. Some way must be found to convert the yearly property tax on sustained yield forests to a tax payable when the timber is harvested. In many States, this change in forest taxes must—for the time being—be aided by credits, or advances to the local

taxing units, in anticipation of their deferred returns. The Federal System of Forest Credits should be available to the States which need this form of assistance.

There remains the long-range problem of markets and uses for forest grown products; of a sustained consumption that will pay the bills of sustained yield. Forest industry knows that this is largely its own problem. We do not expect Congress to pass a law establishing a minimum per capita consumption of lumber in the United States. We do ask the government to extend its valuable research; its surveys of forest resources; and particularly its constructive work in timber utilization, new chemical products and wider markets for wood. It has made important contributions to the value and marketing of timber crops; and there are still large fields to be explored.

Furthermore, we believe that in all fields of national activity and jurisdiction, the economic security of the forest crop should be given the same kind and degree of consideration as the economic security of farm crops. This forest-minded policy should be applied, for example, through reasonable protection in the tariff for the species of lumber which the United States produces in surplus and for paper and other wood products which would take a much larger part in our forest economy and sustained yield if the home markets were less restricted. That is to say; if the days of laissez-faire are behind us and national planning for a forest-growing country has taken its place, let's see the job all the way through.

A forest-minded policy has special application in the foreign trade undertakings of the United States. The industry is suf-

fering from the drastic closure of foreign markets. In some regions, notably the Pacific Northwest, that entails a wastage in the conservation and use of timber for products formerly shipped abroad. Loss of foreign trade has weakened the industry; has made it less capable of undertaking a more permanent status.

The Secretary of State has confirmed the finding that "The lumber industry of the United States is fundamentally an export industry." May I add that our forest production, viewed from the standpoint of sustained yield and not as simply the conversion of virgin timber, will yield an exportable surplus; and that a substantial foreign trade is as necessary to the health of forestry as to agriculture. The removal of existing trade barriers and discriminations against our timber products abroad is sound public policy, not only as a means of present recovery but a permanent objective in forest use.

These proposals are offered for a national forest policy that goes all the way through. We realize that they constitute a large order. Their accomplishment will necessarily take time. Our purpose is not to put forward a list of alibies; to excuse forest industry for failing forthwith to measure up to the full expectations and desires of public interest. It is rather to face the realities; to state plainly concrete things that must be done in what we conceive to be a joint undertaking of the public and the industry. The fact that the task is large and complex, and progress will be slow, makes it all the more needful that our groundwork be carefully planned.

Forest industry welcomes the opportunity to do its part.

COOPERATIVE EFFORT IN FORESTRY¹

By HENRY S. GRAVES

THE conferences of 1933 and 1934 were significant as representing an effort by the timber and forest products industries to initiate forestry on a wide scale on private lands. The present conference is designed to render an account of accomplishments and to consider the next steps essential for further progress. In reading the documents sent to me by the President of the National Lumber Manufacturers Association, I detect a tone of confidence, after trial of first steps in the woods, that forestry measures are not only feasible but very worth while to the owner and operator. It may well be that this conference will be even more significant than the others which occurred when the whole undertaking was new to many men and all sorts of problems loomed up as almost insurmountable.

Applied forestry has made its chief advance on public forests. Forestry on private lands has lagged far behind and is still non-existent on a vast aggregate acreage. Even public forestry was brought about only after a long period of educational work. It then moved rapidly, largely because we had to do with a single owner, as the Nation or state, that looks to the widest benefits of the people and is in a position, if need be, to spread costs and returns over generations. The economic complexities of private forestry have caused a still longer period of preparatory work which we hope is now drawing to a close.

One of the primary difficulties in private forestry lies in the character of ownership of the land. Hundreds of thousands of tracts, big, little and in between, are owned by individuals, corporations, and other agencies, each with distinctive objectives and distinctive economic and financial problems. Our Nation adopted the policy of distributing public land to in-

dividuals in small parcels. It was based on the purpose of building a nation of small owners of homes and farms; a splendid objective in laying the foundations for a sound democracy. But the principle of indiscriminate distribution of public forests unsuited to farming and home building has led to some of the most perplexing economic problems we face today in forest conservation. What happened was that as soon as title to land was obtained by individuals, carrying charges began, leading to pressure for realization through timber cutting or sale. This pressure increased as the years passed and inevitably led to haste in exploitation, sharp competition, periodic over-production and the various industrial and social consequences with which we are all familiar. No more effective device could have been found to deplete the forest resources of the country than that followed by the Government and states in their policy of land distribution; no more effective device to cause instability of the industries and of the communities dependent on the forests.

Stability of the wood producing industries depends in the long run on stability of ownership and use of the forest land. By stability of land use I mean a use that is calculated to bring to the owner returns sufficiently sustained to make it worth while to hold the property and handle it in a constructive manner. This he will not do unless there is a measure of security now or in prospect; represented by opportunity for marketing timber or other resources, security from destruction by fire or other agencies, security from the uncertainties of taxation, opportunity to obtain credit for measures needed in building up and maintaining forest capital. Some of the needs for increased security in land ownership are now being recognized and are included in the program of public aid

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to private owners outlined for consideration at this conference.

In the development of applied forestry in a new country one may distinguish several stages of progress. First there is the necessity for sheer protection of forests from natural factors of destruction; from fire, insects, disease and other agencies. We are fairly well along in meeting this problem.

The next stage in forestry is the initiation of measures to insure a restocking of forests, after cutting, by stands of trees of prospective value. This is the problem of reproduction, or, as the phrase goes, keeping the forests in a productive condition. There is now recognition, rather widespread, of this principle and some effort in actual practice on private lands. This is the elementary beginning of silviculture; to provide for new growth by leaving an adequate supply of trees for natural seeding, or by planting where necessary. It is, however, only the beginning of forestry because mere forest replacement does not take into account continued use of the land to supply industry with raw materials and to supply owners with income during growth of new stands of trees to marketable dimensions. Even if ample provision is made for restocking of the lands, lumbering may remove such a large part of the growing stock of intermediate and smaller trees that it will be many years before there can be further returns from timber. Faced by accumulating carrying charges the owner has little incentive to hold and protect the cut-over land. This leads to instability of ownership and in many cases the property must ultimately be recaptured by the public to safeguard its service for the distant future. Thus merely leaving forests in a condition for reproduction is not in itself sufficient to provide continuous economic service from the land to owners and to industry. Heavy lumbering on a large scale, even with ample provision for restocking, may lead lo-

cally to disastrous economic and social consequences.

This brings us to the third stage in applied forestry, which calls for the reservation on the ground of enough growing stock of intermediate and immature trees to constitute a basis for subsequent cuttings within reasonable periods. This is the objective of so-called selective logging, whatever form that may take. It is the foundation of sustained yield. It provides the owner with income, annually or at comparatively short intervals, to meet interest, taxes, maintenance of improvements and other carrying charges. It is an essential feature in bringing about stability of ownership. It provides for continued local supplies of raw material for industry and thus contributes to permanence of manufacturing plants, sustained employment and stability of communities. If all forests in a given region are handled so that an ample growing stock is left on the ground and provisions made for protection and reproduction after cutting, there is the basis for a measure of regional sustained yield. Protection and reproduction may prevent forest devastation; these measures alone do not prevent economic forest depletion. What the public wants and is increasingly demanding is the prevention of forest depletion that leaves regions and communities for years without forest resources to contribute to industrial activities. In my opinion the introduction of effective measures to conserve growing stock in addition to protection and reproduction is the basic factor in continued private ownership of forest land on a scale evidently in the minds of those who drew up the proposals for this conference.

The principle of conserving growing stock as a basis for subsequent cuttings is expressed in the objectives of woods practice in the documents that have been distributed here, as "conservation of immature and young growth," and "application of the sustained yield principle." It is possible that the words "immature trees

and young growth" may be misleading to some. I would go further and interpret the phrase as meaning leaving enough growing stock to make possible repeated operations in specified areas of the forest at reasonable intervals. This step, together with measures for natural restocking and for protection represent real conservation of forest capital.

The foregoing is a simple statement of principle and objective. Actual application in the woods calls for special methods adapted to varying conditions on the ground. Regional rules of practice represent a constructive step in conserving growing stock and hence of regional sustained yield if they are applied effectively to all owners. Already the feasibility of conserving trees of intermediate size and age as well as young growth has been demonstrated in many forests of the hardwood, spruce-fir, and pine types. West Coast Douglas Fir and Redwood present special problems, but even there some progress is being made in the conservation of growing stock as a base for later service. And in sections of the east, especially on small holdings, special measures are being developed for building up growing stock and increasing its quality and yield.

The final stage of forestry is the organization and management of forests for sustained yield. This involves the organization of a tract or group of tracts to provide a continuous supply of raw material for a specified market. The simplest conception of the principle is the organization of a single large property to meet the permanent needs of a manufacturing plant. The quantity of material cut each year is governed by the yield capacity of the land. If the production from the mill is commensurate with the yield capacity of the land, there is a basis for permanence of operation. Sustained yield management of large forest property involves many complex problems of determination of growth, appropriate methods of silviculture, and systematic plans for cutting, all

adapted to the requirements of the mill and the financial and other business problems of the owner.

The number of private properties, singly owned, that are large enough or sufficiently compact to meet the requirements of a given plant is relatively small. More often the manufacturer would have to depend on the properties of other owners to supply his needs. If a given manufacturing plant is to have assurance of permanence there is involved the necessity of organizing groups of properties for sustained yield, with contractual arrangements with the owners to sell to the manufacturer and to adjust the management of their lands to the master plan for all the properties considered as a unit. This may be called group sustained yield. Such an undertaking offers to the manufacturer an assured supply of timber continuously from lands naturally tributary to the plant. It provides certainty of returns at reasonable intervals to the land owners. It would result in stability in industry and of land use and hence is of vital public importance to communities.

This is the principle underlying the plan of organizing groups of properties for sustained yield, that may serve a single plant or a group of plants, as proposed by David Mason and others for application in the West. One of the proposals for federal legislation before this conference is to secure authority to enable the Forest Service to join hands with other owners for group sustained yield where National Forest land is involved. The same cooperative principle is being applied to groups of small woodlands at Coopers-town, New York and in Coos County, New Hampshire; experiments which I hope may be explained to us during the conference. Still again, I am told, some pulp mill operators in the South are seeking to safeguard future supplies of raw material through contracts with other land owners, that provide for conservative woods practice on all lands. I am not certain, how-

ever, that in such cases adequate steps have been really taken for an assured supply of timber for more than a limited period of time. The reason why such cooperative effort has made little headway is that most manufacturing plants have not been organized for permanence in a given locality. They have been engaged in liquidation of standing timber. Their problem has been to procure enough material to cover at least the period of amortization of capital investments. With the depletion of the virgin forests in many parts of the country and the use of remnants of old stands and of second growth the importance of sustained local supplies of raw material takes on new significance.

Perhaps there is no better illustration of the need for organized group sustained yield than in the South. A new factor in the situation has been introduced by the rapid expansion of the pulp and paper industry. The large cost of a pulp and paper mill involves an element of permanence heretofore not existing in most lumber undertakings. An assured supply of raw material is absolutely essential if these enterprises are to be on a sound basis; and this means not only a supply of material for a few years but continuously. There is a great opportunity to meet these needs through sustained yield forestry. The requirements are for wood of small dimension and hence second growth is suitable. Trees in this region grow with great rapidity. There are no difficult engineering problems in logging, and forest reproduction is readily obtained. On the other hand certainty of securing adequate supplies of pulp wood by a given plant depends on foresight now and definite provision under long term arrangements for access to lands which will be handled under systematic sustained yield forestry. In sections of the South where there is already in sight a concentration of pulp and paper plants, there will be increasing pressure on the forests for pulp wood, as well as for turpentine and other products. Un-

der these conditions the conception of wood procurement assumes a changed significance. It means not only keeping the mill supplied from month to month through cutting on company land, or purchase of material from other owners; it means also making provision for procurement of wood in the future and on a continuous basis through group sustained yield within the territory naturally tributary to the mill. Success will come to those manufacturers who follow this course.

I wonder how many of the new pulp and paper mills in the South have worked out definite plans for such permanent supply of raw material; how many have based their plans on really adequate study of the lands which they count on to provide the present needs and those of later years. It will not do to use merely generalized statistics of growth made up of averages over wide areas. One has to deal with specific tracts that may deviate from the average. And, of special importance, there must be assurance that all the forests involved in the enterprises are properly handled. That can not be left to chance, nor can reliance be placed on some rule of thumb based on general advice from the outside. It will be the wise company that secures under his own employment the services of experienced foresters who will plan out the procurement of material far ahead and will supervise the forestry work on all the lands upon which the manufacturer depends. I predict that there will be increasing pressure by the industries in the South to bring about forest practice on all lands, and to prevent the stripping of all the forest growth, old and young, that can be used.

The interest of the general public in the extension of private forestry is so great as to justify federal and state aid on a liberal scale. In a real sense the public should join with private industry and private land owners in the common problem of constructive forestry. A program of more liberal public assistance in the problems of private forestry is before this confer-

ence. It involves increased appropriation of funds for systematic protection from fire, insects and forest diseases, for procurement of planting material at reasonable prices, for technical advice to farmers and other woodland owners, for forest credits to stimulate organized sustained yield, and for economic and scientific research.

There is to be renewed pressure to establish a system of forest taxation based on sound principles of public finance and administered with consistency and justice. One way to hasten tax reform is to demonstrate the determination and ability of private interests to develop a basis for stable industry and stable land use. The local governmental agencies desire some security against wholesale liquidation of forest resources which may destroy for years the chief base for revenue to meet public expenditures. Group action in forestry in which all land owners and industrial concerns take part offers a far greater inducement for legislative action in bettering tax systems than tax abatement to a limited number of individuals who comply with certain conditions. A measure of economic security for the community is afforded by the first; very little by the second. Personally I doubt if much progress in tax reform will be made until there is assurance to the public of the widespread practice of forestry that will result in clear economic benefit to the community through increased stability of industry and land use. In the meantime I am strongly in favor of vigorous efforts to educate the states to improve their tax laws and practices of tax administration.

The program before the conference calls for enlarged federal appropriations to acquire land for national forest purposes and to aid in building up state forests. This item may induce some debate because there are some who fear too great an extension of public ownership of land. The Forest Service in recent publications has projected a general plan of acquisition covering, for the Federal Government and

the States, an additional area of land to be absorbed in public ownership aggregating more than 200 million acres. So far as I have been able to learn about the areas likely to be included in such acquisition, most of the land is of a character that makes permanence of private ownership extremely unlikely. It is either rather unproductive land in hilly or mountainous country of importance for watershed protection or other general public values, or land so depleted by lumbering and fire that forest restoration under private ownership is impracticable.

Personally I believe that private ownership of forests has a definite and prominent place. My only question is whether the owners and the industries will demonstrate their capacity to handle the lands productively before they are so far depleted as to necessitate public acquirement for restoration and for safeguarding general public interests. There is therefore a very direct challenge to use the present opportunity to inaugurate private forestry on an effective basis and on a large scale. This can be done, I believe, by group action that brings all owners in a given section into active participation. Difficulties in group action will inevitably be encountered because there will be individuals who will refuse to do their part. This is the point at which controls are necessary to bring laggards into line. Your difficulty will be to exercise such control without the help of the public under legislative authority. The program of this conference is a recognition of the necessity for public participation in the cooperative forestry undertaking. It involves very large expenditures from public funds and there will properly be public demand that the plan be effective in preventing economic forest depletion very generally and not merely on a portion of the privately owned land. Your plan will, I believe, lead to some form of public controls to meet local situations and thus develop a type of regula-

tion from the bottom with strong local support. Failure to achieve the results demanded by the public will inevitably lead to controls developed from the top.

I wish to support in every way that I can the general program as announced and most of the individual items of legislation. I am particularly desirous of having the

members of the industry and owners of land appreciate the practical value to them of measures of forestry that will give greater stability and security in their own enterprises. Your leaders are to be heartily commended for organizing this conference to stimulate further steps in applied forestry.



VANISHING SPECIES AREAS

BY AN amendment to the National Forest regulations, the U. S. Forest Service is authorized to designate "vanishing species areas" within the National Forests, wherein wildlife species threatened with extinction or rare plant species will be protected. The regulation provides that Forest Service officers may prevent entry of anyone not authorized to any area which has been closed for the perpetuation and protection of rare or vanishing species of plants and animals, special biological communities, or historical or archeological places of interest. Each "vanishing species area" will be defined by the regional forester and indicated in so far as practical by notices posted along the boundaries and on roads and trails leading into it.

THE FOREST DESPOILERS OF PENNSYLVANIA'S ANTHRACITE REGION

By A. C. SILVIUS

Within the anthracite producing counties are more than two million acres of woodland, all but a few thousand acres of which is privately owned, much of it by the large coal companies. For many years foresters believed that if sustained-yield forestry were possible of accomplishment anywhere in the country, it was in that region. The mines provided a constant market for timber products, the haul from forest to timber yard was short, and the custom of using small-dimension sizes permitted relatively short rotations. The author, with a background of two decades of forestry work in the anthracite region, describes the serious breakdown in the practice of industrial forestry as a result of "bootleg" mining.

THE forests of the Pennsylvania anthracite region, once so picturesque because of their luxuriance, are rapidly fading from that eminence to one of partial desolation. Much of this condition until recent years has been due to the ravages of forest fires. Man's carelessness with fire has made and is now keeping many thousand acres of forest land unproductive.

It has remained for the recent depression to bring forth a new "industry", so charged with evil that little can be said in its favor insofar as the forests are concerned. The "industry" is none other than the much publicized coal "bootlegging" or stealing of anthracite.

In the process of mining coal and in the interest of safety, the miner must support the opening into the earth's interior. For that purpose the best and most available material is wood. Standing timber in the anthracite region is frequently only an arm's length distant and generally only a few hundred yards away. The wholesale cutting of trees is an outgrowth and development of the illicit removal of anthracite.

In the southern part of the region practically all the coal seams are in a rough, mountainous nonagricultural section. The hills and mountains are covered with all gradations of tree growth; from the scrub oak and huckleberry "barrens" on the top of Broad Mountain to the exception-

ally good hardwood sprout timber on the slopes, and choice hemlock, white pine, and white oak in the valleys and ravines.

Many of the anthracite veins "crop out" or come to the surface among the better growth of trees where soil conditions are very favorable to tree growth. Here, within a few feet of his proposed hole or "mine", the miner usually finds almost ideal conditions for the economic development of the coal veins beneath his feet. Very frequently he need only sever the trunk of a tree from its stump to have immediately available as fine a specimen of white oak pole timber as can be found anywhere in the region.

The average anthracite "bootlegger", when he sets out to procure coal for the market, has, therefore, favorable conditions for the safe development of his operations. To say that he does not take advantage of them would be far from the truth. Not only is he liberal in the use of timber; he is extremely wasteful. Trees that a careful woodcutter would utilize completely he may reject as unworthy of a place in his little shelter, so necessary for safety at the "working place." He cuts only the perfectly straight specimens in the sizes most desirable for his use. The props most sought and used vary from 4 to 6 inches in diameter, though considerable timber is regularly cut from 2 to 10 inches.

Since only a small part of any one tree is "just right" for the place or purpose he has in mind, the average tree is cut from 2 to 4 feet high on the stump, and only a butt piece from 5 to 10 feet long is taken from it. Thus, a long section of the upper part of the tree trunk is left to lie on the ground, decay, add to the existing fire hazard, and cause loss to the unfortunate owner whose property is being exploited, usually without authorization or hindrance.

One may walk or drive along the public highways of the region and note with increasing frequency the many places where the forest despoilers have been at work. They invariably surround, or are adjacent to, a "bootleg" hole or its surface "improvements." A typical cutting is very distinctive because of the unusually high stumps and the large quantity of merchantable unused timber in the tops scattered over the ground.

Probably the greatest permanent damage done to the forests by "bootleg" miners is caused at the excavations by the destruction to the surrounding tree growth and the deposits of culm and other debris. In this manner, considerable areas of otherwise productive forest land are kept indefinitely idle and prevented from growing the tree crops that they are so well adapted by nature to produce. Furthermore, the holes are a hazard to everyone who may have occasion to use the forest. To fire fighters they are especially dangerous; when extinguishing a fire at night they risk their lives in ways few other people would willingly do.

A careful survey of the region would disclose considerably more than a million trees cut and partially used by trespassers in the past five years. The damage done to the surface and the trees growing thereon is at least \$2,000,000, which, of course, does not include loss of coal or other underground destruction.

In addition to the above estimated losses

should be mentioned the loss sustained through the forced cutting of immature timber. During the past few years the situation from a forest trespass standpoint has gotten completely out of control. In order to conserve timber assets and prevent destruction and removal of the best trees and stands, forest owners have been compelled to cut their stands more rapidly and frequently over areas that, under more orderly conditions, would be held for the future. Such premature cutting is done to prevent the coal "bootlegger" from obtaining all of the best timber for his illegal operations, and to obtain some measure of return for the tax paying forest owner.

Most cut-over lands, because of prior illicit cuttings, present a very dilapidated appearance, which is anything but a cheerful spectacle to the average observer.

Ten to fifteen years ago it was the custom of many owners to burn the slash remaining after the removal of the merchantable material. Timber then was utilized as closely as is customary in many European forests. Today such forest fire prevention work or other costly cultural activity is economically impossible. Because of the prevailing low prices for timber only the best stands are cut, and usually only that material which is readily marketable, leaving the poorer quality trees or smaller sizes for another crop.

Perhaps the greatest source of danger to the coal measures is from forest fire, which is a serious menace because of the large quantity of timber used to line and support the coal holes. It is possible for a fire to ignite an exposed vein through the burning of adjacent props or timbers. It would seem to be a governmental obligation to prevent such hazards in valuable coal beds and to eliminate existing ones. Boys in C.C.C. camps could be of no greater service in the conservation of a natural resource than their

early use to correct conditions so threatening to the public interest.

The question now probably enters the reader's mind, how and why did this wholesale forest trespass originate? Many and varied answers might be made. Its inception, more than anything else, was the result of a benevolent desire on the part of land owners to assist the needy, especially those living near, or formerly employed at, closed operations. Prior to this time a prevalent custom existed of allowing individuals living in the small towns and mining communities to "riddle" their annual coal requirements from nearby culm banks.

When the depression in the anthracite industry arrived and many collieries were closed permanently, no adequate relief set-up, such as we know now, existed to care for those out of employment. Still, the heads of families tried to maintain their former standards of living. Many had purchased properties during the "boom days" at high prices. With no work or income in sight they were forced either to go elsewhere for a livelihood or to stay where they were and endeavor to create one. Most of the men thrown out of employment were actual miners who knew no other occupation. They could not go to the soft coal fields, for the depression in that industry was even more serious, nor could they easily enter other lines of activity, for the exertions and work of a miner in a comparatively short time practically precludes him from entering other occupations requiring special skill. So the only logical course that presented itself was to stay at home and seek means of sustenance at their usual occupation.

Since the public did not want small-size culm bank coal, such as was formerly prepared by miners for personal use at the sufferance of the owner, a burden was thrust on them to obtain a marketable product, such as the common chestnut

and stove sizes of anthracite, that could readily be sold and thus contribute toward the support of their dependent families.

At first holes were dug in the coal veins by stealth. It must be understood that up to this time the rights of ownership were generally respected and that the large property owners had agents whose business it was to prevent trespass, especially in any form that approached a commercial nature. In consequence the first mining operations were carried on at night under cover of darkness on wild and isolated areas usually at a considerable distance from human habitation. Their work was hard to detect, and when discovered it was even more difficult actually to catch the persons doing the mining. On the approach of the owners' agents it was easy to hide or escape into surrounding mountain fastnesses. Due to public apathy, which almost approached encouragement, the illicit miner became increasingly bolder, and the business soon encompassed the major part of the southern anthracite field. The next recourse of the owners was to dynamite the holes made in the coal veins and thus close them, and make subsequent operation difficult. This method soon proved inadequate because of the great number of men engaged in this activity and the relative small number available to the land owner for its suppression.

The widely prevalent night mining soon spread into an open and unabashed daytime business. Men were now more easily detected and caught in the act of removing or hauling anthracite. Many arrests were made, but when cases were presented in the courts very few persons were found guilty. Thus the business grew and expanded, and, while there has undoubtedly been a recent subsidence, competent observers have estimated an annual illicit production of anthracite of 4 million tons, valued at approximately \$20,000,000.

The use and abuse of forest land by

those not under the control of the owner have undoubtedly turned back progress in private forestry in the anthracite region. It no longer supports a private forest protective association, which formerly operated with good objectives and corresponding results, and which ceased to function about two years ago. Although the breakdown of the rights of private property may not have been the primary cause of the loss of support on the part of forest owners, it was undoubtedly a factor in their failure to continue plans for improved forest protection and practice. The loss of this association is concrete evidence of the depreciated interest of forest owners in their forest properties. To revive that interest and to persuade them once more to set in motion constructive plans for the development and protection of their forests will necessitate lively participation on the part of local law enforcement agencies. An aggressive and militant enforcement of law would quickly reduce the misdemeanors of trespass and petty theft to the low point that prevailed prior to the depression.

When forest owners again regain control of their lands, they will undoubtedly, as a matter of self interest, seek to restore their properties to at least their former productiveness. To do this will require considerable time and much work. In fact, their complete restoration will not likely be attempted by many owners

for some time for financial reasons. However, other avenues of relief are available. The good offices of the National Youth Administration can be utilized to send boys from nearby communities into the forests, there to release and set in motion the potential power of nature to rejuvenate and activate the forests into productivity. In addition, two or three Civilian Conservation Camps should be set up, that they too may have a worthy part in developing and restoring the many damaged and desolated forest areas. It should be a matter of a few years only until the fire-scarred and man-ravaged hills take on a new luxuriance, and the present hazard to life and limb of forest use will no longer be present.

This work accomplished, the problem of the private practice of sustained-yield management should not be difficult. In fact, it should be easy as well as profitable. Timber grown practically at the mine mouth should be worth more as a growing crop than that from a similar forest a considerable distance away. This condition has made for high stumpage values near the mines in the past, and should guarantee the value and profitability of growing trees for mine support in the future. When the integrity of private property arrives again, and it must if we are to continue our present form of government, great progress should be made in the development of private forestry in the anthracite region.

CORNELL: AN APPRECIATION

By BRISTOW ADAMS

Cornell University

ON the morning of May 24, 1914, the secretary of the Society of American Foresters walked from the Ithaca Hotel up the cliff-like steepness of the hill upon which he saw the towers of Cornell University. It was his first visit to Ithaca, and it was a beautiful spring day, and Ithaca weather was at its best. Orioles whistled conversationally in the elms, which were just coming into full leaf.

The occasion of this visit was the first open meeting of the Society of American Foresters away from Washington, at the dedication of the Forestry Building at Cornell, the first building in any American university erected specifically for instruction in forestry. The University of Washington had a forestry building, he knew; but he knew also that it had been made over from the pavilion devoted to forest industries at the Seattle Exposition.

It was fitting, he thought, that Cornell should thus have the first building, because, back in 1898, sixteen years before, Cornell, never having suffered from neophobia as to educational ideas, had established the first course in forestry in any American university. He had heard of it from some of his associates in the Forest Service, Clyde Leavitt and Raphael Zon, R. C. Bryant, Clifford Pettis, and Walter Mulford, for example, who spoke of the "Old School" with loyalty and affection.

These impressions passed through the secretary's mind, pleasantly intermingled with those of the moment; of early morning on a college campus,—and a most beautiful campus,—intersected by box-canyons, or gorges, containing clear streams of dashing cascades and white

waterfalls. Near at hand, students were starting to classes, maids were shaking rugs from the porches of faculty homes, and farther away through the trees and between the buildings shone the surface of the long narrow Cayuga Lake, between steep, wooded shores.

The part of the campus which he first traversed had old buildings of heterogeneous architecture, but blended to some degree by ivy and rendered New-England-like by elms. When he came to the top of the hill, or to the campus of the N. Y. State College of Agriculture at Cornell University, everything was as raw and new as at the youngest of the western state universities. A poultry building had just been finished; the skeleton roof-trusses of a drill hall had yet to be covered and its gable ends were open to the weather; builder's litter surrounded a pilared assembly hall, a soils building was starting to grow, and raw excavations and gradings surrounded the unmistakably new forestry building.

That night, the assembly hall was used for the first time. Gifford Pinchot, former head of the federal Forest Service, and then president of the National Conservation Association, was the main speaker, introduced by Dean Liberty Hyde Bailey, after whom the hall had been named. Bailey had been chairman of President Theodore Roosevelt's Country Life Commission, of which Gifford Pinchot was also a member. Mr. Pinchot arrived late because of a transportation delay, but Dr. Bailey held the audience, particularly by his poems dealing with trees and forests, until Mr. Pinchot came and provided the climax of the day.

The start of the "New School" was thus

auspiciously begun, even though Walter Mulford, head of the department of forestry, was leaving to become head of the department of forestry at the University of California. He had a worthy successor, however, in Ralph Sheldon Hosmer, formerly one of "Pinchot's men" in the Bureau of Forestry, but coming to Cornell from his position as territorial forester of Hawaii.

The faculty was unusually strong, with Samuel N. Spring, who had been in charge of silviculture in the federal service; A. B. Recknagel from the Office of Utilization, and John Bentley, Jr., also from Washington, all imbued with the Pinchot ideals of service, and all men of broad education and wide experience. Cedric H. Guise was just beginning the work that was to make him, also, one of the outstanding men of the faculty, particularly valuable in training men for the federal Service, a field in which the Cornell School has been markedly successful.

Almost exactly twenty-three years after this auspicious event, Cornell University ceased its instruction in professional forestry.

That cessation furnishes the occasion for this sketch. When one of the foremost forest schools in the country gives up the technical training of professional students, some persons may surmise either a lessening of the need for such professional training, or failure on the part of the school to fulfill its functions. Neither of these surmises is tenable.

To understand causes and effects, something of the entire background of the school is necessary, dating back nearly forty years to that first forest school of collegiate rank in the Western Hemisphere.

Its first Dean and Director was Dr. Bernhard Edouard Fernow, who after twelve years as chief of the then Division of Forestry in the U. S. Department of Agriculture, was called to Cornell as the foremost forester in the United States. He

had been thoroughly trained in Germany, to which country most Americans looked for leadership in this field.

The College was given a tract of 30,000 acres of forest land in the Adirondacks, and headquarters were established at Axton. Doctor Fernow saw in this an opportunity to establish a planted and managed forest of conifers to take the place of the mixed hardwood stand. His theory was correct, as proved by the subsequent growth of this plantation, which has been visited by many foresters. One of the many visits made to this planted area was in 1917, when Dr. Fernow was a member of the party.

But Doctor Fernow, as someone has expressed it, had failed to "ripen time". In other words, the time was not yet ripe for this type of clear-cutting and replanting; or at least the public had not yet been sufficiently educated as to the method. What the public saw was an apparent scar on the landscape; controversies arose, politics entered, no appropriation was made for continuing the work at the College, and the lands in the Adirondacks became a part of the New York Forest Preserve.

In respect to Dr. Fernow, these achievements are of record: The curriculum he set up at Cornell is still the basis of the courses of study in all American forestry schools. He established the first professional forestry journal, "The Forest Quarterly", at Cornell in 1902, which continued until 1917 when it was merged with the "Proceedings of the Society of American Foresters", and became the "Journal of Forestry", the official publication of that professional Society.

After leaving Cornell, Fernow was a consulting forester for a time; then he taught at Pennsylvania State College, and afterwards at the University of Toronto where he established Canada's first forestry school. His "Economics of Forestry", and "History of Forestry", as well as his long list of government reports

and technical articles, are classics in their field.

Dr. Fernow died in Canada in 1923; but in October, 1922, Cornell had honored him by giving his name to the building which had been dedicated on that sunny day in May, 1914. Fernow Hall is an enduring monument to a great pioneer in his chosen science.

In 1905-06, a year after the establishment of the N. Y. State College of Agriculture at Cornell University, and in subsequent years, Dean Bailey recommended the teaching of forestry not only to give instruction in forestry as an integral branch of agriculture, and in connection with farm forestry, but as a course of training for professional foresters. In 1910, the Trustees of the University established the Department of Forestry. That year, Walter Mulford, one of the graduates of the "Old School", then a professor of the University of Michigan, came to Cornell as head of the Department.

In 1912, John Bentley, Jr., was appointed an assistant professor and Samuel N. Spring as professor. Another professor, A. B. Recknagel, was added in 1913, and regular professional courses were offered, toward the bachelor degree, with additional study in the Graduate School leading to the M.F. (Master in Forestry) and Ph.D. degrees.

On the resignation of Professor Mulford to accept the position in California, in 1914, Prof. Ralph S. Hosmer became head of the Department and it entered upon the most successful period of forestry instruction at Cornell, maintaining its standards for more than a score of years, in the fields of instruction, research, and extension.

Shortly after Professor Hosmer reached the Cornell campus, arrived also that former secretary of the Society of American Foresters, but not as a member of the forestry faculty. He had supposed that his first visit in May of that year might

also be his last one to the small city of Ithaca, with its University "reared against the arch of heaven." During an inspection trip through western National Forests he had received two invitations to leave the Forest Service; one to become extension forester at the State College of Forestry which had been established, in 1911, at Syracuse University, and one to head the office of publication of the College of Agriculture and Agricultural Experiment Station at Cornell. In November he was on the Cornell campus again and thereafter a chief reason why his "lines were fallen into pleasant places," was furnished by his friends on the forestry faculty, and former associates in the Forest Service under "G. P".

The establishment of the School of Forestry at Syracuse University led to a duplication in two schools supported by state funds. For a time, one school had its official connection with the State Board of Education (Regents of the University of the State of New York) and the other was connected with the State Department of Agriculture and Markets. Then both came under the Education Department, and immediately that department was confronted with the problem of a duplication of work and of appropriations.

Mark Twain once said that "some folks say 'don't put all your eggs in one basket;' but I say put your eggs in one basket and watch that basket!" From the point of view of efficient administration this was the logical course for the state educational authorities. The State College of Agriculture was at Cornell; the State College of Forestry was at Syracuse. Dr. H. H. Horner, assistant commissioner of education, made a study, which formed the basis of recommendations by the State Department; the trustees of Cornell University took the action in November 1933, which stopped undergraduate instruction in professional forestry, to be finally effective in June 1936, with the graduation of those then enrolled in the technical

courses. In November 1936, graduate instruction in professional forestry was also removed, effective July 1, 1937.

Thus ends the outstanding work of Cornell, pioneer and leader in forestry instruction, as far as concerns professional instruction in forestry. The present staff continues courses in farm forestry; for at least a third of New York's forest area is on farms, and the state ranks second in revenue from such woodlands. The extension work, started by John Bentley in 1911, and officially connected with the state agricultural colleges and the federal Department through the Smith-Lever Act of 1914, goes on under Prof. Joshua A. Cope, and James D. Pond. The late Frank B. Moody followed Bentley as extension professor; he resigned in 1915 to become State Forester of Wisconsin, and gave place to G. Harris Collingwood who served until 1924, when he went as Forester and Assistant Secretary of the American Forestry Association.

Many other names should be mentioned, as Prof. J. Nelson Spaeth, primarily engaged in research since 1924. Others have taught under temporary appointments: Professor Bryant of Yale, Emanuel Fritz of California; Ellwood Wilson, B. A. Chandler, Francis I. Righter, and F. K. Beyer.

Historians will catalog the courses, furnish student statistics, list the legislative acts, and inventory the achievements. Some member of the present faculty may write such a record, characterized by a dispassionate accuracy. Modestly, he may leave out of the picture much of the atmosphere and the spirit which have impressed one who knew something of the "Old School", and has been permitted to know much of the "New School".

He has seen the team-play of the staff for more than twenty years and has noted how men of widely different temperaments worked together harmoniously and effectively. Questions of administration and

policy were matters of free discussion in staff meetings, where many differing opinions might be offered; but when the decision was reached, it was always sure of unity of support.

Hosmer's administration was informal; each member of the staff had his duties, but was sure of the aid of any, or all, of the rest if such aid were needed. With all imbued with the same ideals and actuated by the same objectives, no clenched hand was necessary. The plan worked successfully for a quarter of a century, and it was to the morale engendered by this faculty comradeship that much of the strength of the Cornell Department of Forestry was due.

The bronze tablet to Fernow in the Forestry Building, and the oil portrait of the school's first dean, painted by his daughter-in-law, Mrs. B. E. Fernow, Jr., may have helped to keep his ideals alive, as the picture of the man in forest green, against a background of his loved trees, looked with clear blue eyes on the later generations of forestry students.

With these students a peculiarly happy relation existed, observed by all who saw the complete solidarity of the department. For faculty and students worked together and played together. Nothing of the traditional enmity of instructor and instructed ever had a place in the teaching. Both were working together to achieve knowledge. Parts of the building were shared with other related courses, notably ornithology, nature study, and wildlife conservation.

On the top floor, a spacious club room was provided for the "Cornell Foresters", and this room, with its open fire-place, was the first of its kind in the University. Here hangs the grotesque portrait of Patron-Saint Murphius, canonized by an early group in the new school, as the weird personification of the hopes and aims of the Cornell foresters, or forestry club, made up of his ardent disciples.

The forestry camps were both a joy and

a despair to the students. The joy came from the intimate playful association with the "profs" in camp life; the despair from the continuous hard work. As one of their songs expressed it:

"Six reports before we go
Curves and card-index also
Each one said, I'm feeling rather low;
It's been no vacation!"

But there was joy in the working. Faculty and students found time to write songs and to sing them, too, led at first by Bentley, and after Jack died, by the lusty Recknagel. Never was more earnest endeavor and more blithesome gayety combined in any school, and never were students any happier or any busier.

They had every opportunity to keep up with the latest developments; they helped with the many College woodlots, they had a part in the development of Cornell's Arnot Forest, one of the foremost demonstration forests of the eastern United States; they knew the Adirondacks, and the southern pineries from summer field trips, and they became familiar with forest work on many other tracts. Their professors held high place in national, state, and local organizations and associations of foresters and of the lumber industry; and these professors shared with the students the results of meetings and conferences.

These students have made places for themselves, notably in the federal Service, where the proportion of those who have

passed the government's technical examinations has furnished an outstanding record.

In the "Old School" 97 students were enrolled, of whom 15 received the degree of Forest Engineer; and 22, when that school was closed for lack of state appropriation, continued their work elsewhere and obtained forestry degrees from other colleges.

The "New School" from 1910 to September 1937, conferred 447 degrees; 353 bachelor degrees; 88 master's; and 2 doctors of philosophy. These went to 377 individuals, of whom 368 are now living; most of them adding to the fame of Cornell's educational contribution to forestry.

"Old School" and "New School" have passed as far as concerns the professional training of foresters. But most of the members of the faculty are still there, and their ideals will continue to affect the students with whom they come in contact in the present more limited field of farm forestry.

The sincerity and seriousness with which all of Cornell's work in forestry has been done, leaves an indelible stamp on the future. And there, after all, is the real reward. Its light was worthy because it was kindled with enthusiasm and kept aflame by a spirit of unselfish service. Looking back, there is a task accomplished; looking ahead, one sees many generations building upon the foundation laid at Cornell, and keeping green the memory of the school and of those who made it great.

TREE-FORK AND STEEL TAPE FOR CLOSE MEASUREMENT OF SMALL DIAMETERS

By W. H. CUMMINGS

Central States Forest Experiment Station

In connection with certain phases of silvicultural and entomological research it is essential to measure accurately the diameter of trees or stems. The author describes a modified steel tape and a tree-fork which permit such measurements to be made accurately and rapidly

PERHAPS because forest measurement interest started with the merchantable stand, American instruments for tree measurement have not developed to a stage of refinement exhausting their practical potentialities for silvicultural investigations. Explanations of growth features essential for the ultimate production of high quality merchantable timber may evolve from investigations at points in the long train of development of a merchantable stand where critical differences are of a magnitude not economically assessable by conventional units of tree measurement. In certain phases of silvicultural and entomological research at the Central States Forest Experiment Station, developments in the closer measurement of trees have afforded significant early inferences for the functions of both height and diameter growth.

Diameter growth does not take place by tenth-inch intervals—in most trees even through a reasonable time for intermittent remeasurement. MacDougal (17) and Haasis (12) have summarized valuable findings growing out of appreciation of the importance of intimate knowledge of diametral changes in trees. The evolution of an instrument, the MacDougal dendrograph, for continuous record of diametral changes of an order of 0.004 inches was prerequisite to their contributions.

Several types of instruments are used for the single measurement of bole size in the plane at right angles to the long axis of the stem. The diameter tape measures

girth and converts this into diameter for an equivalent circumference. The tree caliper is fundamentally an instrument for the measurement of the thickness of trees. The straightedge jaws merely facilitate reliable measurement of maximum thickness under each calipering position. Some instruments measure the stem as a subtended arc. The appropriate circumference, or its diameter, is determined either by the magnitude of a variable angle, as in "tree shears" and the Biltmore stick, or by the distance of the stem arc from the vertex of a fixed angle, as in the tree-fork.

The relative reliability and efficiency of girth and caliper measurement of tree diameters have been repeatedly discussed by authors of forest mensuration texts, and others (5, 6, 14, 15, 16, 18, 19, 20). Certain desirable standardizations in diameter measurement practices have been recommended for a number of forestry organizations (2, 4, 10, 13, 21).

For the recurrent intra-growing-season diameter measurement of small black locust stems the writer, while with the Locust Borer Investigation of the Bureau of Entomology and Plant Quarantine, refined instruments for reading to 0.02 diameter inches. The significance of this subdivision was validated for the magnitude of the instrumental errors, the measurement and remeasurement errors, and the interim diametral changes on these stems.

The standard 20-foot steel tape reading to diameter inches and tenths was modi-

fied in the following respects:

(1) A direct vernier reading to 0.02 diameter inches was superimposed on the tape zero index.

(2) 0.5, 1.5, and 2.5 were marked on the diameter scale at the proper points to facilitate close reading under the sharp tape curvature around small stems.

(3) An 8-foot tape length—or capacity for 31-inch diameters—was determined upon as adequate for the proposed uses.

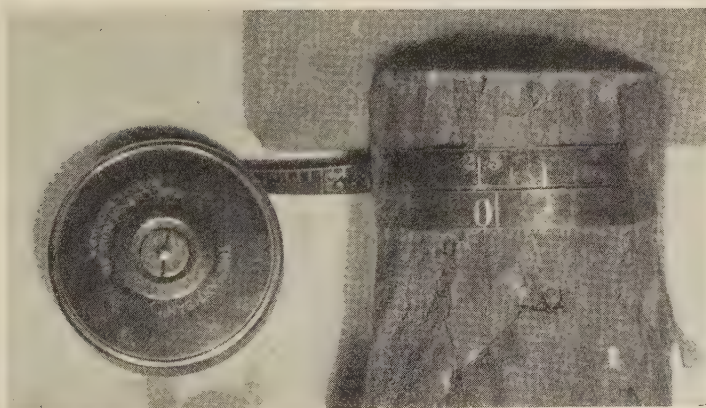
This special diameter tape (Figure 1) was made by the Lufkin Rule Company. Their plate is available for duplication of this special diameter scale. The Canada Forest Service (2) has recommended for permanent sample plot records the measurement of tree diameters to 0.01 inches with a vernier tape. Although such a diameter tape has not come to his hands,

the writer has tested by field use six verniers reading to 0.02 or 0.01 diameter inches. From the three of these with some advantageous feature the direct vernier reading to 0.02 was selected as the most suitable refinement for the standard diameter tape.

The standard steel tape eventually bends or breaks when used in girthing very small stems. Since a tape that is badly sprung or mended is considerably less efficient and accurate, a minimum limit for girthing is advisable—in addition to the usual precautions against abuse. For the standard steel tape a 1.5 inch diameter is a safe minimum. Several diameter tape designs differing from the standard steel tape are adapted to the girthing of smaller stems. The small light steel tape on a ratcheted spring reel,



A



B

Fig. 1.—A. Modified diameter tape scale showing the vernier occupying waste space between 0.0 and 0.4 diameter inches and the supplementary half-inch markings.

B. Modified diameter tape reading 2.56 inches diameter, to nearest 0.02 inches.

credited to Frothingham, is an excellent pocket piece but generally has not proved rugged enough for hard usage. Cuno (8) has described a modification between this very light tape and the standard. For shorter than standard 20-foot tape length, the smaller sized case appears an especially desirable feature. The ingenious diameter tape of a cellophane wrapped paper scale improvised by Craighead (7) introduced a construction design of great possibilities for girth measurement. Even though satisfactory in practice, the modification reported by Abell (1) of fastening the scale to the cellophane sheath appears undesirable because ordinary wrapping cellophane will permanently stretch up to ten per cent of its length. However, if the cellophane sheath encloses a scale that is free-sliding, and that will maintain constant length under atmospheric variations, the fact that ordinary cellophane is readily distorted under tension should be no serious obstacle to precise instrumentation.

The tree caliper has no fundamental limitations for measurement of small stems. Improved design for close measurement and for convenience in carrying is incorporated in the collapsible metal Swedish calipers. Certain stems, that because of branchiness, thorniness, vining or tight forking are difficult to girth with a tape, may be effectively measured with calipers or tree-fork. The problem of binding resistance to removal from the stem measurement position confronted in tree caliper design does not arise in tree-fork construction.

The writer designed a tree-fork with a 3-inch diameter capacity for the rapid measurement of small stems difficult to girth with the vernier tape. This tree-fork (Figure 2) employs a fixed angle with a limb, perpendicular to the bissection of the angle, sliding to tangency on the subtended arc—the stem. Efficacy for small diameter stems and desirability of a reading scale in the same units as the stem diameter determined the size of

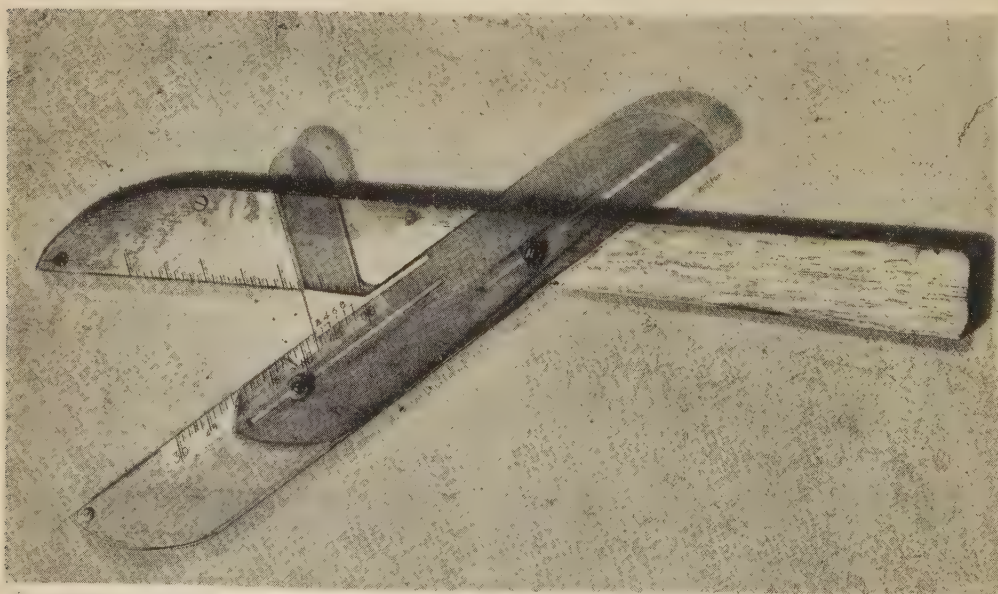


Fig. 2.—Improved tree-fork with fixed angle of $40^{\circ} 42'$ set at diameter reading of 0.78 inches. Reading limb calibrations are in actual inches and tenths. A slip of paper has been inserted under the sliding scale to accentuate the vernier calibration.

the fixed angle at $40^{\circ} 42'$. The geometric construction for this tree-fork is given in Figure 3, and the writer's solution of $40^{\circ} 42.3'$ is developed to the cubic in Appendix 1. There is a rather strong case for the use of a fixed angle of about this magnitude in a tree-fork for close measurement.

The improvised $40^{\circ} 42'$ tree-forks were of simple construction. The bearing edges of the fixed angle and the sliding limb were fabricated from discarded celluloid triangles. The fixed v-angle was glued and screwed to a light hardwood "y" that afforded a convenient handle. The sliding limb was slotted for two pins on the reading limb of the v-angle to track at the correct angle. The index of the sliding scale was equipped with a retrograde vernier reading to 0.02 inches against tenth-inch graduations on the reading limb.

In using this tree-fork, the v-angle is set firmly tangent to the stem, the sliding limb is advanced to tangency, and the stem diameter is read directly on the reading limb—either in the measurement position or after removal. Increasing the complexity of this three-piece instrument, with the attendant disadvantages through wear, by a design for bringing the sliding limb to stem tangency through spring tension appeared of dubious merit. Uniformity of bearing pressure of the angle and of the slide, easily maintained manu-

ally, is important for the close measurement of spongy or scaly barked stems.

While the described instrument was of original design, the measurement of a cylinder by a subtending angle has long been in use in wire and other gauges. A cursory search of literature showed that the first instrument employing this principle for tree diameter measurement was described under the apt term "tree-fork" by Ferguson (11). In its present development this tree-fork employs a fixed angle of 60° for rapid, rather rough measurement of small diameters. Later, Eriksson (9) reported a Swedish patent on an instrument employing the 60° fixed angle with a sliding limb that is brought to stem tangency under spring tension. This Swedish instrument is probably the one referred to in the Pennsylvania announcement (3).

The vernier tape and the tree-fork described have proved rapid and reliable for close measurement in rather difficult stands of young black locust. Diameter points for stems measured with the tree-fork may be indicated by the cross of a finely painted "f"; similarly, for tape measurement a "t" may be painted. To serve as a tape guide for intra-seasonal remeasurement, several brass brads are set in the bark along the lower edge of the tape in the initial measurement position. Using the tape on trees from 1.5 to 6.0 inches in diameter, and the tree-fork on smaller stems, remeasurement in black locust was reliable to 0.02 inches—95 per cent of the measurements will fall within 0.02 inches of the mean. For stems larger than 10 inches the tape vernier readings are, in general, of no significance. The capacities of the vernier tape and the tree-fork are qualitatively assessed in Table 1, from experience with single readings to 0.02 inches checked by remeasurement.

The use in combination of instruments assessing tree diameters on different prin-

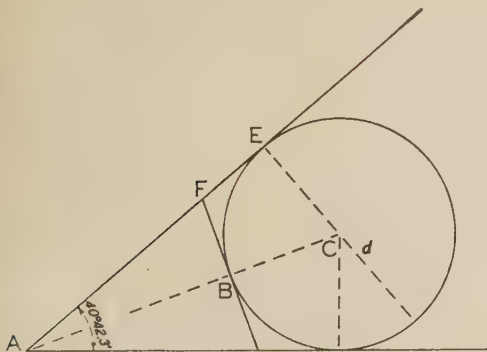


Fig. 3.

ciples introduces the question of conformity of measurements that are made with the tree-fork and with the diameter tape. Comparative readings with the vernier tape, tree-fork and precise calipers on 19 black locust stems between 1 and 3 inches in diameter indicate the character of tree-fork and caliper discrepancies from the tape measurement as standard. Averages of two caliper measurements showed a highly significant mean difference of 0.034 inches less than the tape reading—95 per cent of the calipered values will fall within the limits of girthed diameter—0.13 inches, to + 0.06 inches. Diameter values with the tree-fork, from single measurement on stems up to 2 inches and from two measurements on stems over 2 inches, largely fall between the values obtained with a tape and the values obtained with calipers. Ignoring an insignificant mean difference for this sample, 95 per cent of tree-fork measurements will fall within limits of girthed diameter—0.10 inches to + 0.10 inches. The discrepancy between tree-fork and tape measurement of black locust diameters would seldom exceed—and in many score com-

parisons has not exceeded—the least subdivision of the standard diameter tape, one-tenth inch. The findings of Ferguson (11) that both tree-fork and calipers gave lower basal area values than the tape, with the tree-fork in closer conformity to the tape, confirm the order of discrepancies found by the writer between these types of instruments.

SUMMARY

Two instrumental modifications, namely, a vernier diameter tape and a tree-fork, were developed for the rapid, close diameter measurement of stems between 0.02 and 10.0 inches. The refinement of the standard steel diameter tape, through the superimposition of a direct vernier reading to 0.02 inches and numbering of the half-inch points for smaller diameters, makes possible closer diameter readings without introducing any limitations to ordinary use of the instrument. The tree-fork is a unit assemblage of, (1) a fixed angle of 40° 42', with the reading limb graduated from the vertex in tenth-inches, (2) a sliding limb, with a retrograde ver-

TABLE 1

EFFICACY OF SPECIAL DIAMETER TAPE AND TREE-FORK FOR MEASUREMENT TO 0.02 INCH OF DIAMETERS FROM 0.1 TO 30.0 INCHES

(Based chiefly on measurements of black locust.)

Instrument	Bole or branch diameter classes in inches				
	0.1-0.3	0.4-1.4	1.5-3.0	3.1-10.0	10.1-30.0
Diameter tape	Use impossible (beyond capacity)	Unsuitable; efficacy and reliability decrease with diameter decrease	Effectual, rapid, reliable		Efficacy, speed and reliability decrease with diameter increase
Tree-fork	Effectual, rapid, reliable		Effectual, rapid; reliability decreasing with diameter increase	Use impossible (beyond capacity)	

nier reading to 0.02 inches, and (3) a "y" base and handle. This instrument may be easily constructed from celluloid triangles and a piece of seasoned wood. The combined use of these instruments has proved highly satisfactory for diameter measurement in silvicultural investigations of black locust. The tape is used on the larger stems, and in the narrow but often important range of diameters up to 1.5 inches the tree-fork is used in supplement. The need for close measurement of diameters in other investigations may be satisfied by these instruments. The tree-fork is well adapted for rapid measurement in pruning, reproduction, and cleaning studies.

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APPENDIX 1

TO DETERMINE THE FORK ANGLE, A , THAT GIVES A READING LIMB DISTANCE, AF , EQUAL TO THE TREE DIAMETER, D .

In Figure 3, *given*: $AF = d = 2 EC$

In the similar right triangles ABF and AEC :

$$\frac{BF}{AF} = \frac{EC}{AC}$$

$$AC = BC + AB$$

In the right triangle ABF :

$$AB^2 = AF^2 - BF^2; AB = \sqrt{AF^2 - BF^2}$$

$$AC = BC + \sqrt{AF^2 - BF^2}$$

$$\frac{BF}{AF} = \frac{EC}{BC + \sqrt{AF^2 - BF^2}}$$

With diameter substitution of, $AF = d$; $EC = BC = \frac{1}{2}d$:

$$\frac{BF}{d} = \frac{\frac{1}{2}d}{\frac{1}{2}d + \sqrt{d^2 - BF^2}}$$

Multiplying through by 2 and transposing:

$$d^2 - BF d = 2 BF \sqrt{d^2 - BF^2}$$

Squaring and transposing:

$$d^4 - 2 BF d^3 + BF^2 d^2 - 4 BF^2 d^2 + 4 BF^4 = 0$$

Substituting any diameter value, $d = 1$:

$$1 - 2 BF - 3 BF^2 + 4 BF^4 = 0$$

Factoring:

$$(BF - 1)(4 BF^3 + 4 BF^2 + BF - 1) = 0$$

The irrational root of the cubic was found:

$$BF = 0.3478 \text{ (correct to 4 places)}$$

In Figure 3:

$$\frac{BF}{AF} = \sin \angle BAF$$

For any value of d , (here taken as "1"):

$$\frac{BF}{d} = \sin \frac{1}{2}A = 0.3478$$

$$\frac{1}{2}A = 20^\circ 21.2'$$

$$A = 40^\circ 42.3', \text{ (to the nearest minute)}$$

That is, the fork angle giving the reading limb distance equal to the tree diameter is $40^\circ 42.3'$.

PRIVATE FORESTRY: ITS MEANING AND OBJECTIVES¹

BY J. H. PRICE

U. S. Forest Service

Despite the fact that the author of this paper is in public employ his discussion of private forestry problems is singularly realistic. The fundamental problems confronting private forest landowners in the West and legitimate public measures to alleviate the present situation are discussed in detail. Following Mr. Price's paper will be found Mr. Woodbury's comments, in which his conception of the meaning and objectives of forestry practice, both public and private, are given in a trenchant, incisive manner.

IN A moment of curiosity during my preparation of this paper, I looked into a standard dictionary to secure the accepted general meaning of the words "forestry" and "private". I found forestry defined as the "science and art of establishing, caring for, or cultivating forests—the management of growing timber." In no place was there a direct reference to harvesting. Logging, saw milling, and marketing were ignored, except indirectly, as the establishment of a forest may depend upon the method of harvest. The emphasis of the definition was on tree growing.

When I read current literature on the forest problems of California and other western states, I find little reference to the art and science of growing timber. Rather our problem seems to be almost wholly confined to the ripe crop of timber that we have on hand which, because of its economic environment or physical condition, or both, needs to be harvested. I read much about taxes on virgin stumpage, about interest charges on timber bonds, about excess mill capacity, and about over-flooded markets. Evidently many of our critical problems are those having to do with timber that is already grown rather than with the growing of new supplies. The economic situation in which we find ourselves is a difficult one and there does not appear to be any per-

fect solution. The mere fact that it is largely of our own making, does not alter the need for all agencies, both public and private, to bend their best efforts toward a satisfactory way out of the difficulty. The point I want to make is that the management of these mature timber properties, with their drift toward speedy liquidation, is not entirely a matter of "forestry". I think we can think more clearly about the possibility of private forestry if this distinction is kept in mind.

When I looked up the word "private" in the dictionary I found it defined as "not public in character or nature, belonging to or concerning only an individual person, company, or interest," and then I began to wonder if there could ever be such a thing as "private forestry" in the strictest sense of the word. Regardless of ownership and assessment rolls, we have become accustomed to think of the forest and other wild lands as being in some degree public property. Somehow in our delegation of ownership we have reserved certain elements for the public. We have reserved a habitat for wildlife. We have reserved or dedicated to others than the owners the waters that flow from the forests. And we have retained a feeling of proprietorship in the forest as a place for out-door recreation. I think that such a limit on the delega-

¹Presented at the Annual Meeting, California Section, Society of American Foresters, January 8, 1937.

tion of ownership has been perfectly natural. It is only when land is intensively used by the registered owner that all of the prerogatives of ownership can be assumed by him. So far, our management of forest land certainly has not been intensive and there is a difference between rights of ownership as applied to such lands, and those applied to intensively cultivated lands. It is probably this difference that has led to much more attention, on the part of the public, to forest conservation, than has been given until recently to soil conservation on our farming areas. The other evening I was talking to an old friend of mine, a retired newspaper man, one who has reviewed the passing parade in California for some forty years. I asked him as a reasonably well informed layman to give me an expression on forestry and forest problems. His reply was that he had only one concern; that a growing tree should take the place of each one cut. This, I think, is a fair sample of the public attitude toward our forests.

I was interested some time ago, in reading the comments of various foresters and timber owners who have visited German and other European forests. As I remember, every comment brought out the fact that we, in the West at least, are not yet on a timber-growing basis and until we arrive there, private forestry, as it is defined and practiced in Europe, has no large place. This fact, I take it, does not apply so fully to the eastern portions of our Nation, where real timber culture and scientific forest management cannot be far off. Other thoughts expressed by several observers of European forestry are concerning the public attitude toward forest lands and the acquiescence of owners in such an attitude. I think it was well expressed by George Cornwall in the January 1935 issue of the JOURNAL OF FORESTRY, when he described the German ideal as follows:

"Any sound forestry philosophy places duty to society and State before vested right, which means to say, that trees are the common heritage of mankind placed on earth by bountiful nature for all to use and enjoy. Being both perishable and renewable, trees are things to be used intelligently when ready to harvest and things to be replaced for generations to come."

Different as the conditions in Germany are from those that exist in western America, I see nothing in the philosophy that is contrary to what is, or should be, our own. It is merely that we have not learned fully to apply it.

I should think that two of the principal elements of scientific timber growing would be: first, to keep forest land producing usable commodities at capacity; and second, to bring these commodities to maturity at proper speed and in proper sequence. In other words, we want the crop produced efficiently and so timed that it will meet the needs of industry. Upon both of these phases of management, the removal of our present virgin crop has an important bearing. Part of the job of producing any crop is its establishment. If this can be done by preserving in the processes of harvesting the new crop already provided by nature and at a cost less than artificial regeneration, then this is the way to do it. Certainly we want to take advantage of every opportunity that nature gives us. In this period of transition from timber cutting to timber growing it is clear that we need to plan for a crop of second growth, maturing at the time our virgin stands begin to fail to meet the demands of industry. Otherwise a hiatus will result, with serious effects on industry and likely with premature cutting of second growth. Such a condition can be avoided by leaving the cut-over lands with such a reserve stand that economic maturity will take place at a relatively early date,

or by cleaner cutting and prolonging the harvest of the virgin timber through a much longer period. The exact course to be followed in any particular unit depends upon the silvicultural condition of the stand, the financial condition of the owner, the tax situation, existing investments in plant, and other similar elements.

If an owner had sufficient virgin stumpage in relation to his logical producing capacity to last through an entire rotation and could prolong economically its cutting through such a period, then, theoretically, all he would need on his newly cut-over land, in order to maintain production indefinitely, would be a carpet of seedlings. On the other hand, if the supply of virgin stumpage is only sufficient or can only be held for part of a rotation, then he must endeavor to have a second growth to maturity at the time of exhaustion of his virgin supply. Under proper management, the availability of virgin stumpage beyond the date of maturity of the second growth is not important. In fact, an owner desirous of a certain sustained production from his forest property would be better off without any excess virgin timber. The ideal situation would be where there was but one year's supply of mature stumpage on hand each year, a condition that we should approach, under desirable forest management, as the virgin timber disappears.

Certainly we cannot have proper private forest management without the opportunity for continuous and sustained income. Theoretically, at least, the possibility of such sustained income from our more productive forest lands of the West is by no means remote. Let us take for example an acre of good red dirt along the western slope of the Sierra. If such an acre can produce 300 board feet per year, it is not unreasonable to assume that this material at maturity would have a value of \$1 on the stump. Out of this

there might be paid a tax of 25 per cent by the severance method or otherwise (it really would not make any difference), a protection charge of 10 cents and an administrative or selling cost of 15 cents. This would leave a net return of 50 cents per acre per year, which is equivalent to a return of 4 per cent on \$12 an acre land, of 6 per cent on \$8 an acre land, or of 10 per cent on \$5 an acre land. Such land values represent the theoretical value of the earning capacity of the soil and are higher than current values for this class of property. One of the difficulties, of course, is to find a property where there is the proper sequence of age classes to make continuous and reasonably uniform yields possible. Putting a forest property in this condition is the thing of most importance from a forestry angle in harvesting mature timber. When this condition is once obtained on any given tract, the practice of private forestry would appear to be as simple as any other agricultural pursuit.

While I have said that solution of our present vexing problem concerning privately owned virgin stumpage is not forestry, in the strictest sense of the word, I did not want to belittle the seriousness of these problems to the landowners, to the forestry profession, and to the general public. As before stated, there does not seem to be any single solution and, undoubtedly, the situation must be attacked from all angles. Certainly, from the public point of view, one of the principal endeavors should be to leave the cut-over lands not only in good producing condition, but with as much advanced growth as good silviculture on one hand, and permissible investment on the other, will allow.

Prolonging the cutting of virgin stumpage until second growth matures may, in many instances, be impractical, due to financial situations beyond the control of the owner. There are, however, certain methods of relief that have been proposed

from time to time, that offer to make it more practicable to meet this situation. First, there is the matter of protection against fire and insects, both of which could be strengthened and thus increase the security of investment in virgin stumpage; the cost of both could well be borne from public funds. Second, there is the matter of forest credit at reasonable interest rates, a service which the federal government has extended to various kinds of industries, but not so far in a form that is best suited to forest properties. Third, there is the matter of acquisition by state or federal government of that portion of virgin stumpage in any given unit in excess of the amount the present owners seem able to carry for the period that proper management of the unit requires. All three of these endeavors seem to me to be within the proper field of government aid in solving some of our difficulties. On the part of the landowner (and in mentioning the landowner I am thinking not only of the owner-operator but also of the owner who sells his stumpage to others) there can be alertness in leaving his cut-over lands in the best possible shape. Such studies as have been made on economic tree selection show that the smaller diameter does not pay its way and that there is quite a broad diameter class through which the profits of utilizing are meager or uncertain. There should be left on the ground not only trees that are clearly below the economic limit, but also those that are not clearly profitable.

Another thing that the owner can provide is a reasonable clean-up of the haz-

ards resulting from logging. This is not an easy task and it involves some cost if it is done reasonably well. In the pine region the cost and technique are well known. In the redwood region we are far from having the proper solution, although some encouraging results have been obtained. The matter of the operator leaving cut-over areas reasonably free from slash hazards would be a strong argument for paying the cost of subsequent protection from general public funds. The experience under the Lumber Code has shown that all these suggestions are practicable.

In closing I want to say that I have the utmost faith in the possibility of private forestry on our better timber sites. We must, however, set the stage for it and that is one of our most difficult problems at the present time. It is one on which the owners and the state and the federal government must work together, and I want to second what Mr. Woodbury wrote recently when he expressed the idea that what we need are more plans that will work, and to develop such plans is a matter of individual study of each natural unit. Here is a field for more public effort and certainly a wide field for the private forester and economist. Both groups having been undermanned, we have been expecting too much with no or little effort. We need economists who are not slaves to the ordinary rituals of their profession and foresters who are less concerned with the minute details of timber culture than with the broader aspects of the problem. Thus workable plans can be made that will evolve into real private forest management.

COMMENTS

By T. D. WOODBURY

U. S. Forest Service

MR. PRICE has raised the very pertinent question as to whether there is any such thing as "private forestry" in this country at the present time. It is my contention that members of the profession of forestry have a definite job, or jobs, to perform, and that their objectives must be much the same, whether they are working on public or private land. It is undoubtedly true that when working on private land they are compelled by circumstances to give higher priority to the objective of immediate monetary return than when working on public land. It is now generally conceded, however, that all natural resource industries must have regard for public welfare. The degree to which this public welfare factor may be taken into account by private foresters in their everyday work depends upon what it will cost to take these factors into account, the desires of the landowner for whom they are working, legal requirements, and what the public is willing to pay for forestry practices which are designed primarily to secure public benefit rather than private profit. It is my position that the practice of forestry can have but one meaning and one set of objectives. The incident of employment determines the emphasis placed on these various objectives, but cannot change them otherwise. On the basis of the above hypothesis (with which I believe and hope many of you will heartily disagree), I shall discuss briefly the field of forestry practice as I see it today as illustrative of the meaning of and objectives of the profession.

In the mind of the layman 30 years or more ago a forester was simply a tree planter. This conception is still with us

to too great a degree. I doubt if there is a forester in the room who has not had a question like this directed at him: "What do you do anyway? I suppose you plant trees?" The public has been very slow to recognize forestry as a profession well grounded in science and based upon facts disclosed by research. We still have a considerable distance to go to secure complete public recognition of the difference between a professional forester and a craftsman, but we are gaining ground.

The successful practice of forestry requires the same routine as the successful practice of medicine: first, the basic theories must be secured; then the application of this knowledge to diagnosis of particular cases; and last, the prescription of a treatment which will remedy conditions found. Other things being equal, professional men who have secured the best educational groundwork (step one) are best equipped to make accurate diagnoses and to prescribe the best and most effective treatment. Diligence, common sense, good judgment, and ability to deal with people are essential to the successful practice in any profession or business.

As I conceive it, the practice of forestry in the broad American sense means the intelligent management of wild-land areas in such a way as to correlate multiple uses and build up the all-round productive capacity of the area, with due knowledge of and regard for both biological and economic laws.

It is evident, then, that the successful practicing forester must be a many-sided individual. He must be sufficiently versed in silviculture to devise and use cutting practices which will result in improving the composition and growth rate in his

forest. He must be able to prepare workable plans for regulation of the cut which, while providing for a continuous cut, will build up both the quantity, and quality of the growing stock.

In the field of appraisal he must be able to determine tree values, log values, and forest land values. He must have a sufficient knowledge of logging engineering to at least check logging engineering plans intelligently.

In the field of mechanical engineering he must be in touch with modern developments and must be quick to adopt new and economical methods of logging which promise both cheaper logs and less logging damage.

He must be skilled in the art of fire fighting, must know enough about destructive forest insects to recognize the work of each and to carry out effective insect control, and must have a sufficient smattering of forest pathology to recognize the early indications of disease and to ascertain what control measures are practical and apply such measures.

The proper correlation of multiple uses of the forest requires, also, that our forester shall be a stockman, a landscape engineer, a game manager, and a soil expert.

In the field of range management it is his job to secure as complete utilization of the forage resource as is compatible with production of the maximum timber crop and with the protection of other forest values. This means that he must be able to detect the abuse of range and the effect of grazing on timber growing and other uses. He must be resourceful in applying corrective measures to abused ranges, such as reduction of the herd, changes in class of stock, fencing, salting, water development, and proper timing of use of the range, which will allow of complete utilization of the forage.

As a landscape engineer he must have a practiced eye for detecting the unsightly. The preservation of the natural

beauty of the forest, while harvesting the crop, is the modern challenge to foresters, which must be answered by thoughtful planning of woods operations and by preventive measures designed to prevent forest desecration by those who use our timbered areas. Too many of us still do not recognize opportunities for preserving natural beauty, and too many of us who do recognize these beauties do nothing to preserve them. Personally, I cannot accept without protest the doctrine of the park enthusiasts that the only beautiful forest is the virgin forest. I see beauty in a cut-over area from which the old virgin growth and diseased and dead timber has been removed, leaving only the thrifty, lush foliated young trees. Such a forest has a cheerfulness and a vitality that appeal to me. If foresters stressed this viewpoint more generally, I believe that it would be accepted by a great many more people. Certainly, the National Parks, present and future, cannot accommodate all recreationists. A large number of people, even today, seem to be finding as congenial a recreation atmosphere in the National Forests as in the Parks—even in cut-over areas on these Forests.

Game management is now recognized as an important corollary of forestry in this country. While specialists are essential in this field to collect and interpret the basic facts, all forest managers are now called upon to secure a sufficient knowledge of the habits of game and the requirements of game propagation, so that an increase of game may be furthered rather than hampered by other forest activities, such as forage utilization and timber cutting operations, particularly. In timber cutting operations such as stand improvement, it is necessary to know that certain species of low timber value, such as oaks, have a high forage value for deer. Also, that extensive clean cut areas are unfavorable to deer because they offer no spots suitable for rest and refuge.

By slight modifications of cutting practice along streams and around springs, such refuge and rest spots may be readily created.

Our forest soils are now being studied intensively by experts to ascertain both the soil requirements of tree species and more particularly the susceptibility of various soils to destructive erosion. This type of research must be followed closely by the modern successful forest manager and its results must be applied in practical and effective manner in conducting everyday forest activities such as range and timber management.

The above illustrations, which might be carried much further, are indications

of the broad field which the forestry practitioner must cover. The field is constantly broadening. Within recent years, federal foresters, particularly, have been called upon to delve more deeply into the field of sociology and to consider all activities in the light of their effect upon local, as well as national, community welfare.

It is a trite saying that American prosperity is founded upon our bountiful wild-land resources. If this is true, then the continuation of our high standard of civilization is dependent upon the proper management of these resources. In devising and maintaining this type of management, foresters can contribute more than any other professional group.



CHINESE elms as high as 15 feet, and cottonwoods more than 16 feet tall are now growing in two-year-old shelterbelt plantings made by the U. S. Forest Service in the Great Plains area. In a region ravaged by dust-storms, parched by unprecedented drought, and devastated by grasshopper hordes, trees that were 18 inches high when planted in the spring of 1935 have made this growth. Honey locust planted in drifting sand in the spring of 1936 grew to a height of 7 feet before the end of that season, and cottonwood planted at the same time made a growth of 9 feet during the year.

Scientific research established the fact that successful results could be achieved only through the planting of trees which had been raised in nursery beds in that locality from seed which had been harvested locally. Satisfactory survivals could not be secured from trees grown in adjoining states, or grown from seed which had been harvested in localities other than those in which plantings were to be made.

RECREATION PLANNING IN THE NATIONAL PARKS

By L. F. COOK

National Park Service

In 1935 approximately 750,000 people visited the National Parks in California. There are reasons to believe that the use of National Parks will still greatly increase. To provide adequate facilities and safeguards for this large number of people, and, at the same time, to prevent the deterioration of the recreational areas requires careful planning. Some of the problems confronting the recreational planner are described in Mr. Cook's article.

FOREST recreation development has been recognized as an important function of the National Park Service since this organization was established in 1916 to administer the National Parks. The service has pioneered in the recreational development of wilderness areas. The experience gained should be of value in other recreational developments. There is still much to be learned in both development and protection of such areas.

The basic policy of the National Park Service involves two conflicting objectives of administration, namely, conservation of natural conditions on the one hand, and development for public use and enjoyment on the other, which are very difficult to reconcile. These two objectives, however, are basically important in recreation planning.

For years development and protection have lagged far behind use of forest areas. Administrators have been slow to realize the importance of coordinated and planned development. We have been prone to look upon the recreationists as an unavoidable problem to be put up with but not encouraged. During recent years the popularity of forest areas for recreation has increased far beyond our expectations or preparations to handle.

Public use of the California National Parks for recreation, inspiration, and health has increased more than 240 per cent during the past decade. The figures for the California Parks show that in 1925 approximately 310,000 visitors were

registered while in 1935 there were 750,000. The increase for the whole National Park system has been from 2,054,922 in 1925 to 7,676,490 in 1935, or an increase of 274 per cent. As a result of this increase in use the National Park Service has been taxed to the limit to prevent abuse of at least parts of these areas, and an orderly development and careful planning have been very difficult to carry out. Plans proposed a few years ago either have had to be abandoned or so much modified as to really constitute new plans. It is still impossible to predict the peak because even during the depression, there was an increase in use. Forest recreation development, as yet, has hardly scratched the surface of its possibilities and the administration of every forest area must face the need for planned recreational development or at least protection against abuse by users.

Recreation use is an important social service that the people demand and have a right to expect on public forest lands. It must also be recognized as economically important and frequently that the highest use, both socially and commercially, of forest areas will be recreation. The operation of forest camps and hotels, hunting and fishing facilities, pack train operations, etc., provides much local employment and furnishes the major sources of income for many communities in forested areas. These activities are comparable to any other commercial enterprise

which can be carried on in the area. In the past, due to competition and lax administration, recreation use has not been as satisfactory as it might have been. Planned development can assure permanent, stable employment and income for the local people and it should be considered in any economic planning of utilization of forest areas.

It has been estimated that the average recreationist spends at least \$2 per day while in the woods, which means that the expenditure (if each visitor spent only 1 day in the California Parks in 1935) was at least $1\frac{1}{2}$ million dollars, most of which was distributed among the local people, or at least within the state. This is not an insignificant return from 850,000 acres of forest land, especially when it may be considered a regular annual income.

Correlation of recreation with other uses is a difficult problem that requires detailed study of each particular area. Enjoyment of forest scenery and logging generally can not be associated, stock grazing and camping do not go together, and livestock grazing competes with pack-train operation. Protection of watersheds is endangered by unregulated recreational use. However, the requirements for recreational use can sometimes be coordinated with other uses if relative values and regulations are planned. Frequently it will be found that when the demand or importance of an area for recreation is great enough it will overshadow the value of the area for other uses both socially and economically. Relative costs of development and protection in relation to return from other purely commercial enterprises can be computed on a long term basis, although many intangible values enter the recreational use picture.

Recreational use calls for much careful planning. Fire protection is not the least important, not only because fires quickly ruin the recreational value of an

area, but also because recreational use itself increases the fire risk. Sanitation is extremely important and the problems increase as use becomes more intense.

It is very important that provision be made to prevent abuse and deterioration of areas intensively used. Satisfactory areas for camping, fishing, and scenic enjoyment are limited by topography and water. The more intensive the use, the more rapid the decline will be with the eventual result that the desirability of the area will be lost. In the National Parks we are already faced with over-intensive use of certain areas which is damaging the most popular recreation areas, and the very presence of larger crowds than the area can readily accommodate, has tended to reduce the desirability of the area. Expansion of the used area or better distribution of the users are possible solutions. Restrictions which are not too apparent within public use areas are essential for protection. No better guide to planning along these lines can be found than Dr. Meinecke's two bulletins on "Campground Policy" and "Camp Planning and Camp Reconstruction", in which the whole subject of the recreationist's psychology and needs are ably discussed.

In any recreational plan a very carefully considered road and trail plan is essential. A definite policy regarding wildlife management is important. This must include regulation and development of fishing.

Certain facilities and comforts are essential for the majority of modern forest recreationists, which the pioneer or forest user of a few years ago would consider unnecessary luxuries. The fact that the modern user does not object to segregation or close proximity to others simplifies in many respects the planning of developments. The public now requires nearby grocery stores, service stations, even some form of evening entertainment. The old isolated camp far from civilization no longer appeals to the majority, al-

though there are still many, who deserve consideration, who want some isolation. There is a definite limit to the concentration of use, and any development must provide some privacy or the value of forest recreational use will be lost.

The problem of the lost tenderfoot is one of the difficulties that forest administrators must be prepared to face. Careful signposting, good maps, and proper trail developments are important.

In large campgrounds which are intensively used fuel supply becomes a consideration.

Policing and regulation of popular campgrounds must be considered. Use by the public, unfamiliar, as most of them are with forest conditions and out-of-door life, brings in many difficulties that the administration must solve. One problem that has arisen in the National Parks is

the user who retains, to the exclusion of others, a desirable campsite throughout the summer. When this is multiplied many times, the majority suffers and restrictions are necessary.

The relative desirability and demand for hotel, commercial camps, stores, or public camp developments must be weighed before a comprehensive plan of recreational development can be made. At best it is difficult to anticipate public response, but it is safe to assume that recreational use of the forests has just begun. We can either prepare for it in advance or have it forced upon us.

In conclusion it should be remembered that an appreciation of the recreationist's desires, needs, and shortcomings is essential for planning adequate recreational developments and to protect a forest area from damage through this important type of use.

FORESTRY IN NOVA SCOTIA

By G. W. I. CREIGHTON

Nova Scotia Department of Lands and Forests

The forests of Nova Scotia, unlike those of most other Canadian provinces, are largely in private ownership. The following article describes the forest conditions and the forest administration of the province.

NOVA SCOTIA, Canada's most easterly province, consisting of the mainland, a long narrow peninsula, and the Island of Cape Breton, lies just north and east from the New England states. Of the total area of some thirteen million acres, about nine million acres may be classed as forest land. Generally speaking, the topography of the country is rolling, and, except for the Island of Cape Breton, elevations greater than one thousand feet above the sea level are seldom reached. The geology and soils are diversified, but the main underlying rock formations are granites, slates, and quartzites. The whole province has been more or less glaciated, and as a direct result is characterized by a countless number of lakes and streams. The climate is maritime, both the extremes of heat and cold being tempered by the surrounding ocean. The average annual precipitation amounts to about forty-five inches, and is fairly evenly distributed between summer and winter, with snow general from December till March.

Both hardwoods and softwoods are found in commercial quantities, but Nova Scotia, being north of the optimum range of hardwoods, is essentially a softwood country, with spruce the predominant species. Red spruce is the tree of greatest importance, but black and white spruce are also fairly abundant. Following spruce, balsam fir, hemlock, white and Norway pine are the most important softwoods in the order named. Yellow birch, rock maple, and white birch are the most important hardwoods, but red maple, trembling aspen, red oak, and white ash

also occur in commercial quantities. Until comparatively recent years beech was one of the principal hardwoods, but it has now almost completely disappeared, as a result of an attack of the beech coccus (*Cryptococcus fagi*. Bsp.).

From the time of earliest settlement, lumbering and allied industries have played a prominent part in the economic life of the province, taking today third place after agriculture and mining, the total annual production, including pulpwood and saw-timber, amounting to over four hundred million feet board measure. Unlike most other Canadian provinces, the larger part of the forest land is held in fee simple, the ownership being as follows:

State owned or Crown land	24 per cent
Corporate bodies	29 per cent
Private individuals	47 per cent

As in the rest of Canada, or the whole of North America for that matter, forestry in Nova Scotia is in its infancy. While a number of private companies employ technical foresters, forestry work for the most part is carried on by the government services, both provincial and federal.

In Nova Scotia, the Department of Lands and Forests is responsible for most of this work. Authority is vested in the Minister of Lands and Forests, and under him are a deputy, a provincial forester, assistant foresters, inspectors, rangers, etc. The chief duties of this Department are the administration of the public lands, the organization and maintenance of the fire protective system on all forest land, both public and private, the protection of

game and fur-bearing animals, and the carrying on of educational campaigns with a view to betterment in all phases of the forest industries. While relatively small, the Department of Lands and Forests nevertheless is a revenue producer. The chief sources of revenue are as follows: sale of stumpage on Crown land, land tax, fire tax, the sale of big game licenses, and royalties on fur. The main expenditures include salaries and general administrative costs, fire fighting and maintenance of equipment, survey of Crown lands, game protection, and maintenance of game sanctuaries. The protection and management of game and fur-bearing animals is an important and interesting phase of forestry which is sometimes overlooked.

The most important game animals in Nova Scotia are moose and Virginia deer. Moose have always been an important game animal, but the deer are comparative newcomers to this province. In 1894, nine deer were liberated in Nova Scotia, being taken from the adjacent province of New Brunswick, where they had made an appearance some years earlier, apparently being driven in from Maine as a result of advancing settlement. In 1910 a further lot of five deer was liberated. Since that time their increase has been phenomenal, and as many as four thousand have been shot in one year. While it is popularly believed that the present stand of deer has resulted from the fourteen liberated in 1894 and 1910, it is probable that they would be about as plentiful today had none been introduced, since they cross freely between Nova Scotia and New Brunswick.

As a conservation measure, three game sanctuaries, two of one hundred square miles each and one of thirty square miles, have been established, and a fourth has been tentatively laid out which will be established in the near future. All wild life is plentiful on the sanctuaries, but possibly the most gratifying increase has

been shown with the fur-bearers, beaver, mink, and otter. Of all the fur-bearers the beaver, perhaps, have shown the most remarkable recovery, both on and off the sanctuaries. Thirty years ago it was feared that this animal had become extinct, but a few managed to survive in the interior of the province. They have long been on the protected list, and now are very plentiful all over the southern part of the province. Each year, a number are caught and released in watersheds from which they long ago had disappeared, and present indications are that very soon they will be general over the whole province. In many districts their reintroduction is proving a direct benefit by helping to regulate stream flow, and a number of small brooks which disappeared completely in seasons of drought now have a steady flow all summer.

In Nova Scotia, aside from the public lands, the most fertile field for the practice of forestry is to be found in the farm woodlots. In some sections, particularly in the southern counties where ship- and boat-building make a ready market for piece products, the woodlots are well managed, since the owners place a high value on individual trees. In other sections, however, where portable sawmills and pulpwood operations are common, the same care is not exercised. With a view to interesting woodlot owners in more careful management, a number of demonstration plots have been laid out at strategic points, which have a striking effect on woodlot owners in the immediate neighborhood. Last year a short course on farm woodlot management was started at the Provincial Agricultural College, and a demonstration plot was established on the College woodlot, which will be enlarged from year to year.

As an incentive to land-owners to plant waste areas, nursery stock is supplied free of charge by the Provincial Forest Nursery. Each year some hundreds of persons take advantage of this opportu-

nity, and one lumberman during the past few years has planted over one hundred acres of deserted farm land with spruce and pine. While planting on a small scale will be continued, natural seeding will continue to be depended upon to produce most of the forest of the future. The situation has been summed up briefly and correctly, in the words of Alexander Koroleff: "Forest planting is needed; but, like expensive and strong medicines, should be used only when necessary and in proper doses."

At the present time, the most pressing need in Nova Scotia is for improved logging methods, together with the disposal of logging slash. As already mentioned, only 24 per cent of the forest land in Nova Scotia, amounting to some two and one-quarter million acres, is state owned. Most of this land has been logged, or severely burned, and in the past has been considered of little or no value. In 1934 an intensive survey of the public

land was commenced, which is proving that these lands are of very great potential value. The survey combines the careful retracing of all boundary lines, together with an intensive inventory of all forest cover.

About half the province has been vertically photographed by the Royal Canadian Air Force, and photographic prints supplied by them are proving of inestimable value, both in the field work and in the mapping of timber types and topographical features. Their use eliminates unnecessary time spent in bogs and open fire barrens, and permits the spacing of cruise lines at wide intervals without reducing the accuracy of the estimate. This survey is making possible the management of the public lands in a systematic and intelligent manner, and it is expected that in a comparatively few years the public lands of Nova Scotia will be made to produce their proper share of the total yield of lumber and allied forest products.

SOME INTERRELATIONS OF WILDLIFE MANAGEMENT AND FOREST MANAGEMENT¹

By N. W. HOSLEY

Harvard Forest

The close relationship between forestry and wildlife management is obvious. Nevertheless, the idea that forestry practices are necessarily opposed to the production of game has many adherents. Even a few game managers seem to hold this view. It is refreshing, therefore, to find an outstanding authority in the field taking the position that, in general, the forest wildlife problem must be approached from the standpoint of maximum land use and that forestry plays an important part in this use. Every forester dealing with land-use problems will find Professor Hosley's paper of great interest.

FEW foresters need to be told of the increasing use of wildlife for both recreational and aesthetic purposes during the past decade. The U. S. Senate Wildlife Committee in 1931 estimated that the numbers of hunters and fishermen had increased four hundred per cent in the last ten years. This committee reported the results of a survey by the Southern Newspaper Publishers' Association showing that in fourteen of the southern and southwestern states the numbers of hunters and fishermen equalled the combined numbers of baseball and football fans and golf players. In 1933 494,000 licensed hunters in New York state took a game crop valued at \$2,268,000 (1). And, of course, one of the greatest uses of wildlife comes from the enjoyment incidental to simply seeing it.

Any rational approach to the forest wildlife problem must be from the standpoint of maximum land use. There are likely to be few cases where the production of wildlife alone can be justified on any large, public area, for many years at least. It can be made an important part of the total use, however, by correlating the work for the improvement of wildlife conditions with that for timber production, recreational developments, fire protection, etc. Conflicts in practice are bound to arise, but if concessions are

made from all the major viewpoints, the end values in terms of all uses can be greatly increased.

The ecology of the animal is the first complex to be considered. Each species has its own particular food habits which vary with each season and each region. Each requires particular kinds of cover which often are also a seasonal problem. Each must have the proper conditions for increase, such as good nesting cover, areas where insects are available to young birds, etc. There are also many special requirements such as grit for certain birds and probably vitamin or mineral needs for others (7). The energy needed by the drumming cock grouse or the minerals and vitamins needed by the laying hen are other good examples.

The other complex is the ecology of the forest. The various types from old-field and cut-over lands through the different ages of hardwoods, conifers, and combinations of the two, all have their uses for wildlife. In a wildlife management plan, the succession, both plant and animal, developing with age of the stands is one of the most important considerations. A pure white pine plantation is fine cover for the cottontail rabbit from the time it closes in until a dead length² of a couple of feet is developed, after which this use practically ceases. The same plantation

¹This is essentially the paper presented at the meeting of the New York Section, Society of American Foresters, Albany, N. Y., February 8, 1936.

²Length of bole on which the branches have been killed.

may be used as cover for the ruffed grouse from the time the rabbit abandons it until it is cut. On heavier soils the same stand will develop a hardwood advance growth and many herbs will come in as it matures, thus providing both food and cover for the deer and grouse.

Density of stocking which can be changed by thinnings in the stands is a very important factor, since it largely controls fruit crops and the development of undergrowth, as well as timber size and quality.

Mixed stands are obviously more favorable for wildlife than pure ones, because of the greater variety of food, cover, and other environmental conditions to be found there.

One of the axioms of wildlife management is that all the types necessary for the needs of a given species must be within the area covered by its range, which, of course, is a strong argument for diversity of types (7).

The idea that forestry practices are necessarily opposed to the production of game is not new. The English have felt the supposed antagonism and analyzed the real problem as one of planned forestry operations keeping in mind the needs of the game species (8). It also seems that our own silviculture and management can be made to prove the fallacy of this supposed antagonism.

The first requirement for combinations of forestry and wildlife work is a plan for operations on each tract setting forth what will be done for the development of both resources (10). Not all stands can be made to contribute a maximum of wildlife any more than all can be made to produce a maximum of timber. To make the most of a tract, the natural or potential type units which will support a given wildlife species must be recognized and efforts concentrated on these. For instance, under Massachusetts conditions, a white-tailed deer is quite content over

the period from spring until deep snows come on a hilltop overgrown with brush, briars, wild herbaceous growth, and a few pines under which beds can be made. But, unless there is an area nearby, preferably on a south or east slope or in a swamp, where coniferous stands give greater protection during severe winters, the deer will leave and go far enough to find these conditions. And, whether such a coniferous stand will be used as winter shelter depends also on the availability of hardwood browse, ground hemlock, or other suitable food near at hand (4).

There seems to be no silvicultural operation which cannot influence wildlife to advantage, if properly used.

At present cuttings are, in many cases, a minor phase of forestry on public lands, but they are bound to become more important as the younger stands mature. These cuttings, where hardwood is present either as mature trees or advance growth, produce suitable nesting and summer and fall feeding conditions for ruffed grouse; and also may be used in summer and fall as a source of food by the pheasant as well as being a year-round food supply for the deer and the cottontail (3).

Weedings and improvement cuttings in young hardwoods prolong for a period of ten to twenty-five years the usability of the stands by the deer and cottontail and, if care is taken to favor plants valuable to wildlife at this stage, the start of a long-continued production of food can be made from such species as black cherry, red oak, *Amelanchier*, and yellow birch.

In England the earliest plantation thinnings were made in order to produce better conditions for game. From both the standpoints of good growth and improved conditions for wildlife, thinnings are the most important cultural operation in any dense stands beyond the sapling stage. They are also one of the most neglected measures in our older planted stands as well as in the hardwoods on the better sites. Thinnings have several beneficial

results for wildlife. The trees in thinned stands produce earlier and larger crops of seed; the openings produced by the removal of trees are very valuable, and the opening-up of the stand produces earlier and heavier development of advance growth hardwoods, shrubs, and herbs useful as food by wildlife. Under Harvard Forest conditions, dense white pine stands which have never been thinned are likely to have no advance growth hardwoods before an age of fifty to sixty years is reached, while thinning can reduce this age to around forty years. It is interesting to note that in a study of the winter habits of the white-tailed deer in Massachusetts, it was found that of the eleven most-used species of food plants, nine were found in the older natural pine stands. In variety of these foods, the pine type was surpassed only by old fields which had not yet reached the forest stage, and was equalled by the young hardwood and pine-hemlock types (4).

A conception held by many is that dense stands held to great age without cuttings are the gospel of silviculture and that, therefore, wildlife suffers as a result of forest management. Any forest under sustained yield must have frequent cuttings and the present tendencies toward selective logging and natural regeneration make the creation of many openings even more a part of the operations. Dense, stagnated stands do exist, but their lack of treatment is no more good silviculture than it is good wildlife management.

The planting of conifers is, of course, the forestry practice most often criticized from the wildlife standpoint. All agree that a certain amount of conifers is necessary for wildlife and the effect on game seems to be determined by the percentage of the land planted, the interspersion of the plantings with other necessary types,

the species planted, and the later treatment as described previously. Conifers are necessary as protection for many animals. Winter records have shown a young pine stand to be much warmer during periods of low temperatures than hardwoods or open land and wind movement is, naturally much less in the pine. Also, the need for conifers for concealment is obvious. The interspersion can be controlled by careful planning of plantings. In the matter of species used, European experience coupled with observation of what cases we have in the Northeast states points to the desirability of mixing European larch groups with other conifers on sites where this species grows well (6). This is not only very desirable from a silvicultural standpoint, but, speaking of conditions in Scotland where the important woodlot-using game species is the pheasant, Orde-Powlett says, "European larch, whether planted pure or in mixture with beech or Scots pine, forms a first rate covert. During the first two or three years it forms an ideal and quiet nesting site, better in every way than the old coppice, and more attractive to pheasants than hedgerows and roadsides. . . . From about the fourth year until the eighteenth or twentieth year—sometimes until the twenty-fifth year—a larch plantation forms the very best type of covert, attractive to pheasants, easily driven, and from which they can be readily flushed. Even when it has passed the covert-forming stage, larch, pure or in mixture, promotes the formation of a type of soil rich in pheasant food, and it may be noted parenthetically that pheasants are a valuable enemy of the larch sawfly" (8). Throughout the Northeast it has been found that as larch stands approach middle age, they develop an herbaceous ground cover. Some of them are even used as pastures (6). Although the phe-

³Turberville, H. W., Winter relations of the ruffed grouse to the forest in North. Cen. Massachusetts. Harvard Forest, unpub. Ms.

ant is not a forest bird with us, the larch stands are used by the ruffed grouse, and this tree appears to have great possibilities in breaking up the uniformity of plantations of other coniferous species by providing a different set of environmental conditions.

Norway spruce forms cover which, in Scotland, holds the pheasant up till the stand is around thirty years of age, but from the fifteenth year on, it is next to impossible to get the birds out (8). This makes a certain amount of spruce useful under our conditions as escape cover. The cottontail rabbit uses it for a considerably longer period than it does white or red pine and the snowshoe hare feeds on the browse when available.

Where cuttings have been made on the better soils, it is often possible to select groups of good seedling or seedling-sprout hardwoods, planting only the remainder with conifers, thus developing a groupwise mixture.

The part played by fleshy fruits in the nutrition of our wildlife species is only imperfectly understood, but it is certain that, when available, such foods as the wild grape, apple, hawthorn, etc., form a large part of the fall and early winter food of the grouse, pheasant, squirrels, deer, rabbit, and many kinds of song birds. Such food-bearing plants can often be released with little effort from overtopping growth, adding much to the wildlife possibilities of the tract. Where funds are available for reforestation, plantings of food species of the shrub and tree types in groups or along the borders of wood roads, fire lines, etc., are very much worthwhile. Such plantings should be made only with species which are known to hold their fruit locally until it is really needed by wildlife and which are known to be used by the species of wildlife in the vicinity. Fruits, such as some of the hawthorns, which remain firm and bright on the ground until spring are also very valuable. These plantings are

bound to require some releasing from time to time.

One of the things which may not be as critical in other regions as in central and southern New England is the question of control of the kill to keep wildlife populations headed toward full stocking instead of toward a sparse breeding stock too thin to encourage further hunting. What a strong factor this control can be is shown by experience with white-tailed deer on the George Preserve of the University of Michigan. On 1,280 acres of abandoned farm land a planting of two bucks and three does has increased in eight years so that in 1934-35 a crop of 150 animals was taken off and a stocking of 128 left. Whether the population of a given area is increasing or not can be shown only by repeated censuses. The work of the U. S. Forest Service in the Lake States is outstanding in this direction (9, 10).

Aside from the mechanics of forest wildlife work some other things seem equally necessary in personnel and administration. The men who plan and carry out the work must be trained in both forestry and wildlife management and must appreciate the values of both in order to carry out a rational program. All too often one resource is developed totally ignoring the other. This personnel must be able to diagnose conditions for both wildlife and forest species and to visualize the future ecology of both. A research type of mind is necessary in order to continually make observations of value and to interpret their meaning from a management standpoint.

In a technic as young as that of wildlife management, the tendency is always to generalize from limited information gained, oftentimes from a set of conditions quite different from those in question. Fifty miles often separate conditions of climate, vegetation, soils, and stocking of wildlife which are radically different and, in details at least, every area is a

case in itself. Local study is as necessary with wildlife as it has proven to be in forestry.

There is also sometimes a tendency both in forestry and wildlife work to think that a few improvements can be made on an area and that conditions will then continue to be favorable indefinitely. Only by continued operations can we hope to get anything like the best results from cultural work.

Supposed panaceas of one kind or another are much more spectacular than analyses of ecological conditions or improvement of environmental conditions; but when we are told that some measure will solve all the ills of one or more wildlife species, it is best to be skeptical. When we consider the obviously greater value of the fundamental information gained by the biological surveys being carried out by the Conservation Department on the different drainage systems of New York with that resulting if an equal amount were spent, say, on a wholesale stocking of all sorts of waters with legal sized fish, the results in terms of long time recreation for the people of the state are obvious. If good fortune favored the policy, the indiscriminate stocking might produce a greater total catch for a year or two, while the survey shows where the water conditions are such that fish of a particular species can be expected to live, where they can propagate naturally, how much food is available, and hence how many fish can live in a given length of stream, what can be done to improve conditions, what diseases are present, and many other facts, all of which must be known for rational fisheries management.

Forestry has succeeded fairly well in spite of all sorts of simple remedies pro-

posed for its various ills, and we will hope that wildlife management will be as fortunate.

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EFFECT OF APPLYING ACID LEAD ARSENATE FOR CONTROL OF JAPANESE BEETLE LARVAE ON THE GERMINATION AND DEVELOPMENT OF EVERGREEN SEEDLINGS

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Acid lead arsenate has been found to be effective in controlling the larvae of the Japanese beetle and those of the native white grubs. The authors have made a thorough investigation of the effects of this material on the germination and development of evergreen seedlings. Applied up to 1,500 pounds per acre it has little effect on the germination of the seeds but the rate of growth of most of the seedlings tested was significantly retarded. It is concluded that the application of acid lead arsenate to beds of seedling evergreens is undesirable until further investigation has developed a method of using the material without danger to the plants.

THE application of acid lead arsenate at the rate of 1,500 pounds per acre has been found to be an effective and practical method for destroying larvae of the Japanese beetle in blocks of ornamental evergreens in commercial nurseries in New Jersey. Since 1929 several thousands of western red cedar, pine, spruce, fir, hemlock, cedar, juniper, and yew ranging in height from 1 to 10 feet, have been treated without causing damage to the stock.

In the fall of 1934 an investigation was undertaken to determine whether acid lead arsenate could be applied safely to evergreen seed beds on different types of soil to destroy this insect. The experiments were planned to determine the effect of acid lead arsenate in the soil on the germination and early seedling growth of different evergreens which are used for reforestation. Soil was obtained from forest nurseries in North Carolina and South Carolina, and seeds of pine, spruce, fir, larch, and western red cedar were made available from Pike National Forest, Colo., Chippewa National Forest, Minn., Coeur d'Alene National Forest, Idaho, Pisgah National Forest, N. C.,

Ouachita National Forest, Ark., Lassen National Forest, Calif., Kaniksu National Forest, Wash., Bitterroot National Forest, Mont., George Washington National Forest, Va., Selway National Forest, Idaho, Carson, Wash., Gray, Maine, and northern Florida.

As there is a very close relationship between the problem of controlling the larvae of the Japanese beetle and those of the native white grubs in evergreen seed beds, the effect on the plants of applying acid lead arsenate to protect germinating seeds and young seedlings from attacks by these insects should be of interest to foresters and others concerned with this problem.

EFFECT ON GERMINATION OF EVERGREEN SEEDS IN SASSAFRAS SANDY LOAM

Sassafras sandy loam was passed several times through a sieve with $\frac{1}{4}$ -inch holes to remove stones and debris, and divided into four portions; one portion was not treated; acid lead arsenate was thoroughly mixed with the other portions at the rates of 540, 1,080, and 1,620 grams to 1 cubic yard of soil, which is equivalent to mixing the material at the

¹The assistance of F. C. Craighead and R. A. St. George of the Division of Forest Insect Investigations, Bureau of Entomology and Plant Quarantine, and of the Forest Service in furnishing soil and seeds from localities outside of New Jersey for this investigation is gratefully acknowledged. The writers are also indebted to R. Kent Beattie, C. Hartley, and Lyle W. R. Jackson of the Division of Forest Pathology, Bureau of Plant Industry, for suggestions on the control of diseases on seedling evergreens.

rates of 500, 1,000, and 1,500 pounds per acre with the upper 3 inches of soil in the field. The treated and untreated soil was placed in 3,800 2-inch clay pots and plunged in moist peat on benches in a greenhouse maintained at a temperature of 60° to 70° F. By plunging the pots in moist peat, the soil moisture within the pots was maintained at approximately half saturation during the period of experimentation. Three seeds of each variety were sown, without being stratified, on December 8, 1934, in 50 pots of untreated soil and in the same number of pots containing each concentration of acid lead arsenate. The varieties of seed sown were as follows: Douglas fir (*Pseudotsuga taxifolia*), white spruce (*Picea glauca*), Engelmann spruce (*P. engelmanni*), blue spruce (*P. pungens*), red spruce (*P. rubra*), jack pine (*Pinus banksiana*), slash pine (*P. caribaea*), shortleaf pine (*P. echinata*), Jeffrey pine (*P. jeffreyi*), western white pine (*P. monticola*), ponderosa pine (*P. ponderosa*), Norway pine (*P. resinosa*), northern white pine (*P. strobus*), western larch (*Larix occidentalis*), and western red cedar (*Thuja plicata*). Two plantings of Douglas fir, Engelmann spruce, ponderosa pine, and Norway pine were made because seeds of these varieties were obtained from more than one locality.

A record was made of the number of seedlings appearing above the ground in each pot, first at daily intervals, and later at weekly intervals, for a period of 120 days. The average number of seedlings and the standard error per pot were determined for each treatment and interval of time according to the usual procedure and expressed as the percentage of the total number of seeds placed in each pot. The average percentage germination of the different varieties in the treated and untreated soil at intervals of 30, 60, and 120 days are given in Table 1.

The differences in the germination of the seeds in untreated soil and in soil

containing acid lead arsenate were determined. When the difference is two or more times its standard error, the odds are at least 20 to 1 that the difference is a real one and not brought about by chance. It was found that of the 171 comparisons between the values of the untreated and treated the germination appeared to be significantly decreased in 27 cases, not appreciably modified in 138 cases, and increased in 6 cases. However, these apparently significant differences were not logical. Douglas fir from Pike National Forest appeared to be significantly decreased in germination in the 1,000-pound treatment, although there appeared to be no significant differences between the 500- and 1,500-pound treatments and the untreated. No significant differences were noted between the treated and untreated of this variety from Carson, Wash. The germination of Engelmann spruce from Pike National Forest and Coeur d'Alene National Forest was approximately the same in the treated soil, but 48.7 and 19.3 per cent, respectively, in the untreated soil. In comparing the germination in the treated and untreated soils, the seeds from Pike National Forest appeared to be significantly retarded and those from Coeur d'Alene not changed significantly by the acid lead arsenate. Norway pine from Gray, Maine, appeared to be unaffected, but the seed from Chipewewa National Forest appeared to be retarded. The other cases of apparent significant retardation or stimulation were largely isolated. Furthermore, it is to be expected in a comparison of this nature that some of the values by chance alone would appear significantly different even when there was no real difference. It may be concluded, therefore, that acid lead arsenate did not significantly modify the germination of these varieties of fir, pine, and spruce in sassafras sandy loam.

GERMINATION IN DIFFERENT SOILS

Small quantities of sandy loam were

obtained from forest nurseries in Clayton, N. C., Camden, S. C., and Georgetown, S. C., to study the effect of acid lead arsenate on the germination of evergreen seeds in these soils as compared with the germination in the sandy loam at Moorestown, N. J. The hydrogen-ion concentration of these soils was as follows: Clayton soil had a pH of 5.09, Camden 5.50, Georgetown 5.07, and Moorestown 4.90. The addition of acid lead arsenate did not significantly modify the pH of these soils. As the quantity of these imported soils was limited, it was possible to test the effect of acid lead arsenate on only two varieties. Jack pine and slash pine were selected. The percentage germination and the significance of the difference in the germination in the untreated and treated soils were determined as previously described. The results are given in Table 2.

Jack pine and slash pine were slower in germination in soil from Camden, S. C., than in soil from Georgetown, S. C., Clayton, N. C., or Moorestown, N. J. In the 72 comparisons between the values of the untreated and treated the germination appeared to be significantly retarded in 5 cases, not appreciably modified in 61 cases, and increased in 6 cases. However these apparent differences appeared at random, indicating that the variation was by chance alone rather than a real variation. As these results are similar to those obtained with a larger number of seeds in sassafras sandy loam, it appears that acid lead arsenate has no significant effect on the germination of pine seeds when used up to 1,500 pounds per acre in these different soils.

EFFECT OF ACID LEAD ARSENATE ON THE DEVELOPMENT OF EVERGREEN SEEDLINGS IN POTS

It was originally planned to study the effect of acid lead arsenate on the growth of all of the seedlings which were used

in determining the germination in treated and untreated soils. Unfortunately, several of the varieties germinated poorly and many of the seedlings in the greenhouse were attacked by a juvenile root rot and damped off within a few weeks after emerging from the soil. There appeared to be no satisfactory method for controlling this infection after the seeds had germinated. Four months after sowing the seeds there were only a sufficient number of plants of Jeffrey pine, ponderosa pine, and slash pine remaining for study of the seedling development.

In April these plants were repotted in 3-inch pots, thinned to 1 plant per pot, and plunged in the ground in the field in partial shade. In September the soil was removed from the plants by shaking and washing and each plant was measured. The average growth of the plants in untreated soil and the per cent reduction in growth in the treated soil are given in Table 3. Ten representative plants of each treatment were tied together and photographed. The appearance of the pines in the different treatments is illustrated with slash pine in Figure 1.

It was found that all concentrations of acid lead arsenate reduced the growth of Jeffrey pine, ponderosa pine, and slash pine seedlings in the different soils. The average decrease in growth was 38.7 per cent in the 500-pound treatment, 47.3 per cent in the 1,000-pound treatment, and 50.9 per cent in the 1,500-pound treatment. It is apparent that the detrimental effect on the growth of pine seedlings becomes greater with the increase in the quantity of the arsenical per acre.

ABSORPTION OF ARSENIC FROM SOIL BY PINE SEEDLINGS

When the growth of slash pine, Jeffrey pine, and ponderosa pine, referred to in the previous section, had been determined, the tops were separated from the roots of approximately 25 plants of each

TABLE I
EFFECT OF APPLYING ACID LEAD ARSENATE TO SASSAFRAS SANDY LOAM ON THE GERMINATION OF EVERGREEN SEEDS

Variety	Source of seed	Period after sowing Days	Untreated Per cent	Average germination		
				500 pounds acid lead arsenate Per cent	1,000 pounds acid lead arsenate Per cent	1,500 pounds acid lead arsenate Per cent
Douglas fir	Pike National Forest	30	33.3 ± 4.9	29.3 ± 3.9	21.3 ± 3.8	35.3 ± 4.6
		60	34.0 ± 4.9	29.3 ± 3.9	21.3 ± 3.8	36.0 ± 4.5
		120	34.0 ± 4.9	29.3 ± 3.9	21.3 ± 3.8	36.0 ± 3.5
Douglas fir	Carson, Washington	30	7.3 ± 2.4	7.3 ± 1.3	5.3 ± 1.7	4.7 ± 2.1
		60	13.3 ± 3.1	6.7 ± 2.1	10.0 ± 2.5	11.3 ± 2.8
		120	18.7 ± 3.3	12.7 ± 2.7	23.3 ± 3.6	20.7 ± 3.5
White spruce	Chippewa National Forest	30	1.3 ± 0.9	7	-----	1.3 ± 0.9
		60	1.3 ± .9	7	-----	2.0 ± 1.1
		120	2.7 ± 1.7	5.3 ± 2.2	7 ± .7	7.3 ± 2.0
Engelmann spruce	Pike National Forest	30	48.7 ± 5.7	24.0 ± 4.0	18.0 ± 3.7	16.0 ± 3.4
		60	48.7 ± 5.7	24.0 ± 4.0	19.3 ± 3.7	16.0 ± 3.4
		120	48.7 ± 5.7	24.0 ± 4.0	19.3 ± 3.7	16.0 ± 3.4
Engelmann spruce	Coeur d'Alene National Forest	30	17.3 ± 3.0	23.3 ± 3.9	26.7 ± 4.3	20.7 ± 4.1
		60	18.0 ± 3.2	25.3 ± 3.9	26.7 ± 4.3	21.3 ± 4.2
		120	19.3 ± 3.2	28.7 ± 3.9	30.0 ± 4.4	22.7 ± 4.2
Blue spruce	Pike National Forest	30	33.3 ± 4.6	29.3 ± 4.4	25.3 ± 4.4	24.0 ± 4.6
		60	34.0 ± 4.5	30.0 ± 4.4	25.3 ± 4.4	24.0 ± 4.6
		120	34.0 ± 4.5	30.0 ± 4.4	25.3 ± 4.4	24.0 ± 4.6
Red spruce	Pisgah National Forest	30	7 ± .7	4.7 ± 1.9	6.0 ± 2.6	5.3 ± 1.7
		60	8.7 ± 2.3	15.3 ± 2.7	18.0 ± 4.0	14.7 ± 3.2
		120	20.0 ± 3.4	24.0 ± 3.6	28.0 ± 4.4	22.0 ± 5.5
Slash pine	Florida	30	47.3 ± 4.3	37.3 ± 3.9	42.0 ± 4.2	39.3 ± 4.0
		60	56.7 ± 4.4	54.0 ± 3.8	58.7 ± 4.3	49.3 ± 4.6
		120	74.0 ± 3.5	75.3 ± 3.3	74.7 ± 3.7	68.7 ± 3.8
Jack pine	Chippewa National Forest	30	6.0 ± 2.7	9.3 ± 2.1	4.0 ± 1.5	2.0 ± 1.1
		60	8.0 ± 2.4	16.0 ± 2.9	6.0 ± 1.8	4.7 ± 1.6
		120	17.3 ± 3.0	23.3 ± 3.5	9.3 ± 2.1	6.7 ± 1.9
Shortleaf pine	Ouachita National Forest	30	6.0 ± 2.0	8.0 ± 2.4	9.3 ± 2.5	5.3 ± 2.0
		60	16.7 ± 3.7	17.3 ± 3.4	16.3 ± 3.2	15.3 ± 2.9
		120	39.3 ± 4.4	40.0 ± 4.1	38.0 ± 4.6	38.0 ± 4.2
Jeffrey pine	Lassen National Forest	30	31.3 ± 3.6	26.7 ± 3.8	13.3 ± 2.8	12.7 ± 2.8
		60	38.7 ± 3.8	32.7 ± 3.8	28.7 ± 4.0	18.7 ± 3.0
		120	42.7 ± 3.8	45.3 ± 3.6	36.0 ± 4.1	30.7 ± 3.1
Western white pine	Kaniksu National Forest	30	2.0 ± 1.1	7 ± .7	2.7 ± 1.3	7 ± .7
		60	24.7 ± 3.5	17.3 ± 3.2	30.7 ± 3.5	22.7 ± 3.2
		120				

Ponderosa pine.....Lassen National Forest.....	30	14.0 ± 3.2	24.7 ± 4.2	21.3 ± 3.5	22.0 ± 3.6
	60	35.3 ± 3.7	40.0 ± 4.5	40.0 ± 3.7	36.7 ± 4.3
	120	54.0 ± 4.1	56.7 ± 3.9	50.0 ± 3.9	46.0 ± 4.4
Ponderosa pine.....Bitterroot National Forest.....	30	5.3 ± 1.7	6.7 ± 1.9	8.0 ± 2.2	6.0 ± 2.0
	60	12.0 ± 2.8	14.7 ± 3.0	12.7 ± 2.5	16.0 ± 2.9
	120	14.0 ± 2.9	16.7 ± 3.2	14.0 ± 2.5	17.3 ± 3.0
Norway pine.....Gray, Maine.....	30	60.7 ± 4.3	62.0 ± 5.4	56.7 ± 5.1	68.7 ± 4.3
	60	61.3 ± 4.3	62.7 ± 5.3	58.0 ± 5.1	70.7 ± 4.3
	120	61.3 ± 4.3	62.7 ± 5.3	58.7 ± 5.1	70.7 ± 4.3
Norway pine.....Chippewa National Forest.....	30	62.7 ± 4.9	46.7 ± 4.8	42.7 ± 5.7	28.0 ± 4.5
	60	64.7 ± 4.5	46.7 ± 4.8	42.7 ± 5.6	32.0 ± 4.6
	120	64.7 ± 4.5	46.7 ± 4.8	42.7 ± 5.6	32.0 ± 4.6
Northern white pine.....George Washington National Forest.....	30	1.3 ± .9	.7 ± .7	.....	2.0 ± 1.1
	60	34.0 ± 3.5	24.0 ± 3.8	40.7 ± 4.1	38.0 ± 4.7
	120	.....	.....	.....	.....
Western larch.....Cabinet, Mont.	30	.....	.....	.....	.....
	60	.....	.....	.....	.....
	120	3.3 ± 1.4	2.7 ± 1.3	2.0 ± 1.1	4.7 ± 1.6
Western red cedar.....Selway National Forest.....	30	.....	.....	.....	.....
	60	.7 ± .7	1.3 ± .9	2.7 ± 1.3	.....
	120	.7 ± .7	2.7 ± 1.3	3.3 ± 1.4	.....

species. The tops and the roots were cut into small pieces and mixed, and two samples were digested separately in nitric and sulphuric acids. The quantity of arsenic in these portions of the plants was determined, usually in quadruplicate, by the Gutzeit method. The total amount of arsenic found and the relative distribution between the tops and the roots are given in Table 4.

It was found that the average amount of arsenic in the pines growing in soil containing 500 pounds of acid lead arsenate per acre was 90 parts of arsenic trioxide per million. In the 1,000-pound treatment it was 114 parts per million, and in the 1,500-pound treatment it was 144 parts per million. The quantity of arsenic absorbed by the plants definitely increased as the quantity of acid lead arsenate in the soil was increased. The arsenic was found largely in the roots, 78 per cent being present in the roots and 22 per cent in the aerial portion on the plants. The increase in the quantity of acid lead arsenate in the soil did not appear to modify appreciably this relative distribution in the plants.

EFFECT OF ACID LEAD ARSENATE ON THE DEVELOPMENT OF EVERGREEN SEEDLINGS IN BEDS

In April 1935, eight beds were prepared at Moorestown, N. J., to study the effect of acid lead arsenate on the development of evergreen seedlings in the field. Each bed was 3 feet wide and 105 feet long and was enclosed on the sides by a wooden frame set to a depth of 6 inches in the ground and projecting 2 inches above the surface. To prevent trouble from damping-off fungi, each square foot in the beds was treated with half ounce of formaldehyde in 1 quart of water and covered with heavy paper for 10 days. At the end of this period the paper was removed and the surface of the beds loosened with rakes to facilitate aeration.

TABLE 2
GERMINATION OF PINE SEED IN DIFFERENT SOILS TREATED WITH ACID LEAD ARSENATE.

Variety	Source of soil	Period after sowing Days	Untreated Per cent	Average germination			
				500 pounds acid lead arsenate		1,000 pounds acid lead arsenate	
				Per cent	Per cent	Per cent	Per cent
Jack pine	Moorestown, N. J.	30	6.0 \pm 2.7	9.3 \pm 2.1	4.0 \pm 1.5	2.0 \pm 1.1	2.0 \pm 1.1
		60	8.0 \pm 2.4	16.0 \pm 2.9	6.0 \pm 1.8	4.7 \pm 1.6	4.7 \pm 1.6
		120	17.3 \pm 3.0	23.3 \pm 3.5	9.3 \pm 2.1	6.7 \pm 1.9	6.7 \pm 1.9
		30	5.3 \pm 2.0	8.7 \pm 2.0	6.7 \pm 1.9	2.7 \pm 1.3	2.7 \pm 1.3
	Clayton, N. C.	60	6.0 \pm 2.0	13.3 \pm 2.3	8.0 \pm 2.2	3.7 \pm 1.9	3.7 \pm 1.9
		120	7.3 \pm 2.2	16.7 \pm 2.7	11.3 \pm 2.8	7.3 \pm 2.4	7.3 \pm 2.4
		30	3.3 \pm 1.4	4.0 \pm 1.5	2.7 \pm 1.3	2.0 \pm 1.1	2.0 \pm 1.1
		60	6.7 \pm 2.1	6.7 \pm 2.1	4.0 \pm 1.5	2.7 \pm 1.3	2.7 \pm 1.3
	Georgetown, S. C.	120	6.0 \pm 1.8	10.0 \pm 2.3	6.0 \pm 2.0	4.7 \pm 1.6	4.7 \pm 1.6
		30	2.0 \pm 1.1	3.3 \pm 1.7	1.3 \pm .9	1.3 \pm .9	1.3 \pm .9
		60	10.0 \pm 2.5	8.0 \pm 2.2	3.3 \pm 1.4	4.0 \pm 1.5	4.0 \pm 1.5
		120	16.7 \pm 2.9	14.0 \pm 3.2	7.3 \pm 2.2	9.3 \pm 2.3	9.3 \pm 2.3
Slash pine	Moorestown, N. J.	30	47.3 \pm 4.3	37.3 \pm 3.9	42.0 \pm 4.2	39.3 \pm 4.0	39.3 \pm 4.0
		60	56.7 \pm 4.4	54.0 \pm 3.8	58.7 \pm 4.3	49.3 \pm 4.6	49.3 \pm 4.6
		120	74.0 \pm 3.5	75.3 \pm 3.3	74.7 \pm 3.7	68.7 \pm 3.8	68.7 \pm 3.8
		30	46.7 \pm 4.2	44.7 \pm 4.1	44.7 \pm 4.1	38.0 \pm 3.5	38.0 \pm 3.5
	Clayton, N. C.	60	64.0 \pm 4.3	62.0 \pm 4.6	59.3 \pm 4.5	57.3 \pm 3.7	57.3 \pm 3.7
		120	76.0 \pm 3.7	78.0 \pm 3.5	76.0 \pm 4.2	77.3 \pm 3.3	77.3 \pm 3.3
		30	39.3 \pm 4.0	28.0 \pm 3.8	32.0 \pm 4.4	27.3 \pm 3.9	27.3 \pm 3.9
		60	49.3 \pm 4.4	36.7 \pm 3.8	41.3 \pm 4.3	39.3 \pm 4.4	39.3 \pm 4.4
	Camden, S. C.	120	63.3 \pm 3.8	58.0 \pm 3.9	55.3 \pm 3.9	57.3 \pm 4.5	57.3 \pm 4.5
		30	40.0 \pm 3.7	35.3 \pm 3.7	32.0 \pm 4.2	36.7 \pm 3.7	36.7 \pm 3.7
		60	60.0 \pm 2.8	52.0 \pm 3.8	48.0 \pm 4.7	51.3 \pm 3.6	51.3 \pm 3.6
		120	76.0 \pm 2.7	80.0 \pm 2.7	70.7 \pm 3.6	72.7 \pm 3.6	72.7 \pm 3.6



Fig. 1. Slash pine seedlings grown in sandy loam from Moorestown, N. J., with and without acid lead arsenate, 9 months after seeding.



Fig. 2. General view of the evergreen seed beds, Moorestown, N. J., used in studying the effect of acid lead arsenate on the development of the seedlings.

After two weeks, when no odor of the fumigant could be detected, acid lead arsenate was applied at rates of 500, 1,000, and 1,500 pounds per acre, and mixed to a depth of 3 inches in six of the beds; the other beds were not treated with the arsenical. Each bed was divided into 21 sections, each 3 feet by 5 feet. The varieties used in the greenhouse studies and, in addition, longleaf pine (*Pinus palustris*) and loblolly pine (*P. taeda*), which arrived too late for the previous tests, were sown in the beds. Three hundred seeds were sown in each section, with the exception of Jeffrey pine and loblolly pine, as there was only sufficient seed of these varieties to use 160 and 235 seeds, respectively. The seed was scattered uniformly over an area 2 feet by 4 feet in the middle of each section and covered with quarter-inch of sharp

sand which had been previously fumigated with formaldehyde. The beds were covered with burlap until the seedlings began to appear, and then were given partial shade by covering with a double layer of 16-mesh galvanized iron wire, placed 18 inches above the ground. The use of galvanized iron wire for this purpose appeared to be very satisfactory. The appearance of the beds in September after the screening had been removed is shown in Figure 2.

The number and the condition of the seedlings in the different treatments on September 17, 1935, are given in Table 5. It was found that the number of plants in the treated beds was less in 39 cases and greater in 21, indicating a trend that the application of acid lead arsenate reduced the number of seedlings. Douglas fir and red spruce were the only varieties

TABLE 3
EFFECT OF APPLYING ACID LEAD ARSENATE ON THE GROWTH OF PINE SEEDLINGS

Variety	Source of soil	Average growth in untreated soil <i>Centimeters</i>	Reduction in growth in soil containing acid lead arsenate at the following rates		
			500 pounds <i>Per cent</i>	1,000 pounds <i>Per cent</i>	1,500 pounds <i>Per cent</i>
Jeffrey pine.....	Moorestown, N. J.....	10.3 ± 0.3	44.8 ± 4.2	51.0 ± 3.8	55.2 ± 4.1
Ponderosa pine.....	Moorestown, N. J.....	9.8 ± 0.3	46.9 ± 4.5	57.8 ± 4.3	61.0 ± 4.5
Slash pine.....	Moorestown, N. J.....	19.1 ± 0.8	30.3 ± 6.4	36.3 ± 5.3	44.6 ± 5.2
Slash pine.....	Clayton, N. C.....	18.6 ± 0.6	27.2 ± 5.0	39.5 ± 4.7	44.6 ± 4.8
Slash pine.....	Camden, S. C.....	14.7 ± 0.6	39.0 ± 5.1	48.5 ± 4.8	43.1 ± 5.8
Slash pine.....	Georgetown, S. C.....	17.1 ± 0.3	44.3 ± 3.4	50.9 ± 3.1	56.8 ± 2.6

TABLE 4
ABSORPTION OF ARSENIC FROM SOIL BY PINE SEEDLINGS

Variety	Source of soil	Arsenic trioxide in plants grown in soil with different amounts of acid lead arsenate per acre								
		500 pounds			1,000 pounds			1,500 pounds		
		Total	Tops	Roots	Total	Tops	Roots	Total	Tops	Roots
		<i>P.p.m.</i>	%	%	<i>P.p.m.</i>	%	%	<i>P.p.m.</i>	%	%
Jeffrey pine.....	Moorestown, N. J.....	99	24	76	123	22	78	175	18	82
Ponderosa pine.....	Moorestown, N. J.....	94	33	67	127	34	66	194	17	83
Slash pine.....	Moorestown, N. J.....	36	21	79	83	28	72	104	30	70
Slash pine.....	Clayton, N. C.....	92	14	86	117	17	83	124	20	80
Slash pine.....	Camden, S. C.....	126	22	78	137	26	74	154	23	77
Slash pine.....	Georgetown, S. C.....	95	17	83	98	19	81	115	18	82
Average.....		90	22	78	114	24	76	144	21	79

TABLE 5
EFFECT OF APPLYING ACID LEAD ARSENATE TO SASSAFRAS SANDY LOAM ON THE DEVELOPMENT OF EVERGREEN SEEDLINGS

Variety	Source of seed	Number of plants in beds on September 17, 1935				Appearance of plants	
		Untreated	500 pounds	1,000 pounds	1,500 pounds	Untreated	Treated
Douglas fir	Pike National Forest	510	441	455	402	Normal	Normal
Douglas fir	Carson, Wash.	351	305	260	268	Normal	Normal ¹
White spruce	Chippewa National Forest	9	17	7	8		
Engelmann spruce	Pike National Forest	297	268	262	250	Normal	Retarded in growth
Engelmann spruce	Coeur d'Alene National Forest	142	144	72	114	Normal	Retarded in growth
Blue spruce	Pike National Forest	406	424	383	359	Normal	Retarded in growth
Red spruce	Pisgah National Forest	194	180	119	111	Normal	Normal
Jack pine	Chippewa National Forest	396	269	236	246	Normal	Retarded and brown
Slash pine	Florida	358	427	377	378	Normal	Retarded and brown
Shortleaf pine	Ouachita National Forest	186	189	159	176	Normal	Retarded and brown
Jeffrey pine	Lassen National Forest	115	111	123	107	Normal	Retarded and brown
Western white pine	Kaniku National Forest	43	41	55	49	Normal	Tips brown
Longleaf pine	Stuart Nursery, La.	59	62	58	49	Normal	Tips brown
Ponderosa pine	Lassen National Forest	240	268	232	208	Normal	Tips brown
Ponderosa pine	Bitterroot National Forest	69	71	67	77	Normal	Tips brown
Norway pine	Gray, Maine	468	445	426	388	Normal	Tips brown
Norway pine	Chippewa National Forest	378	467	459	394	Normal	Retarded and brown
Northern white pine	George Washington Nat. For.	149	234	208	176	Normal	Retarded and brown
Loblolly pine	Pisgah National Forest	215	206	219	191	Normal	Tips brown
Western larch	Cabinet, Mont.	11	10	7	17	Normal ¹	Retarded and brown
Western red cedar	Selway National Forest	0	0	0	0		

¹Too few plants to determine their condition.

which appeared favorably in the treated plots. Engelmann spruce and blue spruce were retarded in growth but showed no browning of the needles; Jack pine, slash pine, shortleaf pine, Jeffrey pine, western white pine, longleaf pine, ponderosa pine, red pine, northern white pine, and loblolly pine were definitely retarded in growth and showed browning of the needles, varying from a slight browning of the tips to complete browning of the foliage.

SUMMARY AND CONCLUSIONS

During 1934 and 1935 an investigation was conducted to determine the effect on different evergreens of applying acid lead arsenate to the seed beds to protect germinating seeds and young seedlings from attacks by the larvae of the Japanese beetle and the closely related native white grubs. The varieties studied included Douglas fir, white spruce, Engelmann spruce, blue spruce, red spruce, jack pine, slash pine, shortleaf pine, Jeffrey pine, western white pine, longleaf pine, ponderosa pine, Norway pine, northern white pine, loblolly pine, western larch, and western red cedar.

Germination of the seeds was not significantly modified by the application of acid lead arsenate to the soil up to 1,500 pounds per acre.

The application of acid lead arsenate significantly retarded the growth of most of the seedlings. With Jeffrey pine, ponderosa pine, and slash pine, 500 pounds of acid lead arsenate reduced the growth 38.7 per cent, 1,000 pounds 47.3 per cent, and 1,500 pounds 50.9 per cent. Most of the seedlings were not only retarded in growth but showed browning of the foliage, which varied from a browning of the tips of the needles to complete discoloration.

In pines, the amount of arsenic trioxide absorbed from the soil varied from 90 parts per million in the 500-pound treatment to 144 parts per million in the 1,500-pound treatment. An average of 78 per cent was found in the roots and 22 per cent in the tops.

It is concluded that the application of acid lead arsenate to beds of seedling evergreens to control larvae of the Japanese beetle or the closely related native white grubs is undesirable until further investigational work has developed a method of using the material without danger to the plants.



BRIEFER ARTICLES AND NOTES



REORGANIZATION OF THE DEPARTMENT OF FORESTRY AT CORNELL UNIVERSITY

Pursuant to suggestions made by the Board of Regents of the University of the State of New York,—the State Department of Education,—the Trustees of Cornell University and of the N. Y. State College of Forestry at Syracuse University have recently taken action that will result, after July 1, 1937, in changes in the teaching programs in the field of conservation offered by these two institutions.

After July 1, according to an announcement made by Dean Carl E. Ladd of the N. Y. State College of Agriculture at Cornell University, all instruction in professional forestry, both graduate and undergraduate, offered under state auspices, is to be concentrated in the N. Y. State College of Forestry at Syracuse, and similarly all professional instruction in wildlife conservation and management in the N. Y. State College of Agriculture at Cornell.

As regards forestry this action was foreshadowed when in February 1933, the Cornell Board of Trustees ordered that undergraduate instruction in professional forestry be terminated at Cornell in June 1936, with the graduation of the classes of undergraduate students of professional forestry then in residence. With the granting, at the end of the present college year, of the degree of Master of Forestry to the graduate students in forestry now at the University, Cornell will cease to confer that professional degree and the Department of Forestry will no longer re-

ceive either graduate or undergraduate students of professional forestry.

The Cornell Department of Forestry will thereafter limit its instruction to courses, nonprofessional in character, designed to round out, as to forestry, the programs of students of Agriculture or of Wildlife Conservation and Management. The extension work of the Department of Forestry will be continued as in the past, following the general program which has been actively pursued in recent years.

To serve students in any department of Cornell University who are especially interested in farm or woodland forestry, or who desire general information about forestry and the broader aspects of conservation, including wildlife conservation in relation to forestry, the courses covering these subjects will be continued. Graduate students in fields allied to forestry may elect to work, in subjects other than professional forestry, under the direction of members of the Staff of the Department of Forestry, as candidates for the degrees Master of Science and Doctor of Philosophy.

RALPH S. HOSMER,
Cornell University.



MEMORANDUM FOR HEADS OF FOREST SCHOOLS¹

Last fall a committee consisting of the heads of the various forest schools in the country was appointed for the purpose of considering the recruiting of foresters

¹Editor's Note: Dean Dana would appreciate receiving any comments or criticisms members of the Society or others may care to make concerning the various proposals made in this memorandum.

into the government service through the Civil Service system, with special reference to the scope and form of the Junior Forester examination. By vote of the forest schools, an executive committee of the main committee was then appointed, consisting of H. S. Graves, Walter Mulford, Henry Schmitz, S. N. Spring, and S. T. Dana, Chairman. Representatives of this committee have met on December 19, January 30, and April 6 with a cooperating Forest Service committee consisting of C. M. Granger, R. E. Marsh, E. W. Tinker, and E. W. Loveridge, Chairman. At the last meeting E. V. Jotter was also present as a representative of the Soil Conservation Service.

The following tentative conclusions reached at these meetings are now being submitted to the members of the full committee for their information and comment:

The Junior Forester examination is designed to test the candidate's grasp of the basic principles and facts which underlie the management of forest land and which should be at the command of every forest school graduate. For this purpose it should cover the subjects listed in the four-year curriculum on page 183 of Graves' and Guise's "Forest Education", and in addition the fundamental aspects of wildlife management, range management, recreational use of forest land, forest influences, and the social aspects and significance of forestry. Separate courses in these latter subjects, while desirable, are not regarded as essential, and it is believed that the necessary ground can and should be covered in really adequate courses dealing with forest management, forest organization and administration, silvics and silviculture, forest economics, and forest policy. Similarly, some knowledge of statistical methods and genetics will be expected, but only to the extent that these subjects are covered by adequate courses in forest mensuration and silvics.

In general, the aim of the examination is to determine the breadth and soundness of the candidate's training in fundamentals rather than his knowledge of the details of some particular branch of forestry. For example, he should be thoroughly acquainted with the main silvicultural systems of cutting and their application in characteristic types, but should not be expected to know the marketing rules used in National Forest timber sales or the "rules of forest practice" adopted by regional lumber associations. He should appreciate the importance of wildlife and forage as an integral part of the forest and as major products of multiple-purpose forestry, and should know the basic principles but not the detailed technique involved in their management. He should be familiar with important legislation such as the Forest Reserve Act of 1897 and the Clarke-McNary Act of 1924, but should not be expected to memorize the exact procedure under which they are administered.

From this it follows that the examination will necessarily cover both basic principles and major facts. The two are indeed, frequently hard to separate. What should be avoided is the asking of questions dealing with the details of administration in a particular organization such as the Forest Service, and with statistics of such minor value for every day use that they had better be looked up when needed rather than memorized. Questions should of course be so framed that there is no doubt as to the correct answer.

It is difficult to test adequately the candidate's knowledge of basic principles and their application by the short-answer type of question that has been used exclusively in recent Junior Forester examinations. On the other hand, the large number of candidates with which the Civil Service Commission has to deal presents physical difficulties in correcting an examination composed entirely of the discussion type of question that are almost

insuperable. As a reasonably satisfactory compromise it is suggested that the experiment be tried of including a few discus-sional questions, possibly to the extent of about 20 per cent of the time required to write the examination. In this connection, it may be noted that the Forest Service would welcome suggestions as to the character of the examination in the form of sample questions submitted by members of forest school faculties.

A detailed study of the effectiveness of past examinations and of the various forms of examinations is now being made by the Forest Service. Present indications are that an examination limited entirely to technical questions does not give as accurate an indication as is desirable of a candidate's probable success after appointment. Consideration is therefore being given to the possibility of adding a "mental aptitude" test which would have some influence on the final rating. The executive committee regards this as a promising lead which is deserving of further exploration.

Previous or sample examination questions should be made available to the forest schools and to prospective candidates, as a means of indicating the scope and character of the examination more clearly than is possible by general statements. Approval by the Civil Service Commission of this procedure appears doubtful but should be strongly urged.

Admission to the Junior Forester examination should be limited to those who have or are about to obtain a degree from a forest school of recognized standing. A minor exception, which would not be noted in the announcement, is the occasional admission by special permission of men without a degree who are already under Civil Service appointment in federal employ and who are regarded as qualified to take the examination.

Decision as to what constitutes a school of "recognized standing" is made by the Civil Service Commission. The Commis-

sion should be informed as to the schools that have been approved by the Society, but for the present at least, the executive committee is not inclined to urge it to limit recognition to these schools.

It does not seem likely that the former examination for "Forest Ranger" will be revived. Appointments to subprofessional positions may now be made from those passing the examinations for Assistant to Technician, Agricultural Aid, and Student Aid. The committee believes that such appointments should usually be made only to positions that cannot be satisfactorily filled by men of junior grade, who would benefit greatly from the training and opportunities for advancement afforded by such positions.

Promotion from a subprofessional position to a professional position should be contingent upon passing an appropriate Civil Service examination. This may be either competitive or non-competitive, the important point being that appointments to professional grades should be limited to men with demonstrated professional qualifications.

The committee hopes presently to supplement its study of the Junior Forester examination by a study of the examinations for Junior Range Examiner, Junior Biologist, Junior Park Naturalist, and other junior professional positions in which foresters may be interested. With these examinations, it sees no present need, so far as forest school graduates are concerned, for the addition at this time of any other examination of the junior grade, since the demand for men with specialized training in any field not covered by them can apparently be met satisfactorily by appointment in the assistant or higher grades.

It will be appreciated if you will send any comments you may care to make either on this memorandum, which has the approval of the Forest Service committee, or on related matters properly coming within the scope of the commit-

tee, to the undersigned at School of Forestry and Conservation, University of Michigan, Ann Arbor, Michigan. A prompt reply will be appreciated, since it is desired to follow up as soon as practicable with the Civil Service Commission, the Forest Service, and other governmental agencies making appointments from the Junior Forester register, such recommendations as may be agreed upon by the full committee and the Council.

S. T. DANA,
Chairman, Executive Committee.



REPORT OF THE CONSERVATION COMMITTEE, SOUTHERN PINE ASSOCIATION

A very well attended meeting of the Conservation Committee, including staff members of the Western Pine Association and Southern Hardwood Producers, as well as West Coast Lumber Company representatives, began with a luncheon Monday, March 29, 1937, and lasted well into the afternoon. In addition to receiving the report of the Association's Department of Conservation, which later was approved by the Board of Directors during the general meeting, and which is printed in the Southern Pine Association Bulletin, the Committee urged the continuance of sectional meetings of loggers and timbermen, such as those called in the past year; felt that the pulp, paper, naval stores, and lumber industries should work closely together in forest conservation; adopted a policy stipulating that the place for publicly owned forests is in areas of low productivity or otherwise unsuited to private ownership, and that any program of public forest acquisition in the South should be proposed by a public agency only after representation from the forest industries; initiated a program to enlighten the public and southern pine consumers as to the constructive nature of the industry's forest conservation prac-

tices looking toward permanent production; endorsed the establishment of practical selective cutting demonstration areas in cooperation with subscribers; approved the further issuance of "Southern Pine Forestry Notes"; reaffirmed its belief that action should be taken by public forestry agencies to effectuate statewide forest fire control; enumerated policies to be followed by the Southern Pine delegates to the Forest Conservation Conference in Washington, on April 7, 8 and 9; voted to request the maintenance of the Southern Forest Survey on a proper basis; and resolved to attempt to secure an appropriation of \$1,000,000 annually—the full congressional authorization—for forest products research by the Forest Products Laboratory.



RED SQUIRRELS ATTACK JAPANESE LARCH

At the Dunbar Forest Experiment Station a little more than a hundred European larch (*L. europea*) and Japanese larch (*L. Kaempferi*) grow in adjacent rows. The soil is the same, the trees are the same age, and site conditions affecting their growth are identical. The trees were received as four year old transplants seven years ago, and the tallest are now 18 feet high. A remarkable disparity in appearance is evident between the two species. Without exception the European larch have grown tall and straight, with the leaders averaging as much as two and a half feet in a single year. The Japanese larch are gnarled and stunted and present the general appearance of having weathered a tornado. The drastic difference in growth is shown in the following tabulation:

	European larch (63 trees)	Japanese larch (56 trees)
Av. total height....	14.5 ft.	4.1 ft.
Av. diam. at 1 ft.	2.67 in.	1.25 in.
Av. d.b.h.	1.87 in.	0.34 in.

The stunting of the Japanese larch is particularly evident. Whereas the d.b.h. of the European is 70 per cent of the diameter at one foot, the d.b.h. of the Japanese is only 27.2 per cent of its diameter at one foot. The difference seems to be attributable to red squirrels. They have been observed in late winter, climbing the trees and cutting off the branches. Terminals are cut off at the bottom of the new growth, and laterals are cut about two inches from the main stem. The ground beneath each tree is littered with branches. That climatic agencies have not adversely affected the Japanese larch is shown by a few trees which managed to escape the squirrels. Their terminal and lateral growth equals that of the European larch. Not a single instance could be found where the European variety was attacked, and the selection of the Japanese seems to be due to a preference for its much larger buds. In the cut twigs, practically all the buds were clipped from them.

W. F. McCULLOCH,

*Dunbar Forest Experiment Station,
Michigan State College.*



AN IMPROVED PAINT SPRAY OUTFIT FOR NUMBERING TREES

The relative advantages and disadvantages of the use of tags and painted numbers in the establishment of permanent sample plots are well summarized in U. S. Dept. of Agriculture Circular No. 333.¹ On the basis of experience obtained from plot work in the farm woodlands of the Central States the writer has found that in many areas painted numbers are preferable to metal tags.

Hall has described a paint spray out-

fit² which the writer used with considerable success during the summer of 1935. The chief advantages of this method are, quoting from Circular 333: "the fine spray is forced into all the cracks and crevices of the bark so that bark smoothing is unnecessary; the numbering can be done free hand and very rapidly; the size of the letters can easily be adjusted to the size of the tree; and the work can be done by relatively inexperienced laborers." The chief disadvantage of the paint spray outfit devised by Hall is its weight and bulk. Consequently, while using this apparatus the writer endeavored to reduce its weight and yet retain its desirable features.

Figure 1 illustrates the assembly of the improved paint spray outfit which has been used successfully for two field seasons. The galvanized air tank consists of a modified 4 gallon Myers "E-Z-to-Fill" compressed air sprayer³ on which the brass extension rod and nozzle were replaced by a pressure gauge and air-line regulator. The gauge, air-line regulator, and "Master" spray gun are described in the general catalogue of Sears, Roebuck and Company. The "Master" spray gun operate satisfactorily under approximately 2 pounds of pressure. While the gun cannot be completely shut off, this may be taken care of by inserting a stop-cock in the connection at the gun. When the stop-cock is opened during the painting process the loss of air between numbers or while walking from one tree to the next may be controlled by holding the index finger over the nozzle. The hose connections between the pressure pump and spray gun are easily made by means of galvanized nipples.

Aside from its portability and light weight (15 pounds) this outfit has the additional advantage of low cost. The list prices of the equipment used are as follows: 4-gallon compressed air sprayer,

¹Anonymous. Sample plots in silvicultural research. U. S. Dept. Agri. Circ. 333, 90 pp. illus. 1935.

²Hall, Ralph C. A paint spray outfit for numbering trees. Jour. For. 34: 141-146. 1936.

³Myers, F. E. and Bro. Pump Co., General Catalogue, Ashland, Ohio.

\$5.50; spray gun, \$6.85; gauge and air-line regulator, \$2.65; nipples and stop-cock, \$0.35; and 4 feet of air hose, \$0.32, making a total of \$15.67.

In a test of the efficiency of the pump

and gun it was found that 100 strokes of the pump furnished approximately 30 pounds of pressure which was sufficient to paint 100 numerals. Efficiency, of course, depends to a large extent on such factors as the size of the numbers, the surface of the bark, and consistency of the paint. By means of the air-line regulator it was possible to reduce the width of the ribbon sufficiently so that trees in the one-inch d.b.h. class could easily be painted while on larger trees having rough bark the spray could be increased accordingly by a slight turn of the adjustable valve.

A number of different kinds of paint have been tried with this outfit. To date yellow spar varnish, outside white paint, white enamel, red lead, and aluminum have been used. In all cases turpentine was used for thinning the paint and cleaning the gun. Further conclusions concerning the relative durability of the various paints will be drawn at the time of future plot remeasurements.

In summarizing, the chief advantages of this outfit appear to be as follows: it is a one man outfit; it is highly portable due to its compactness and light weight; it is easy to assemble; and it is reasonable in cost.

OLIVER D. DILLER,
Central States Forest
Experiment Station.



Fig. 1.—Paint spray outfit for numbering trees.

- A. Galvanized compressed air tank.
- B. Pressure gauge.
- C. Air-line regulator.
- D. Pump.
- E. Paint spray gun.



REVIEWS



C.C.C. Forestry. By H. R. Kylie, G. H. Hieronymus, and A. G. Hall. 335 pp. *Illus. U. S. Government Printing Office, Washington, D. C. 1937. Price \$1.*

"C.C.C. Forestry" has been prepared primarily to aid in the instructional programs in forestry in the Civilian Conservation Corps camps. As stated in the foreword, it is a manual to serve the foreman-instructor in preparing his programs, and to aid the enrollee-student in providing a reference book for self-initiated study and reading. It is adapted particularly for use in teaching with relation to the Outline of Instruction in Forestry, C.C.C. Vocational Series No. 8; in the appendix is a cross-reference guide for correlating it therewith. Numerous officials in the several federal departments advised and cooperated in its preparation.

Of the fourteen chapters, the first three are more or less general; the first and second deal briefly with the structure and physiology of trees, with forests as tree communities, and with forest values including the relationship of the forest to climate, soil erosion, stream flow, social and economic welfare, recreation, and wildlife. The third chapter, entitled Forest Conservation, traces briefly the history of our forests and forest industries, and presents brief pictures of the U. S. Forest Service, the National Park Service, the Soil Conservation Service, the Indian Forests, tree pest control, state forestry and our principal national forestry organizations. The status and problems of forestry on both the large privately owned holdings and the farm woodlands are also

mentioned.

Following the general material are ten chapters devoted to the technical phases of administering and managing forests. Chapters on Forest Protection, Forest Reproduction, Systems of Timber Management (largely silviculture), Forest Utilization, Forest Mensuration, Lumbering, Wildlife Management, Range Management, Forest Engineering, and Forest Recreation follow in the order named. It is of interest to note the inclusion of the material dealing with Wildlife Management, Range Management and Forest Recreation, although it seems to the reviewer that a more logical sequence of chapters would have been possible. The final chapter deals with the training, employment and duties of foresters.

The subject matter is presented at a level which should meet effectively the needs of C.C.C. workers. While well above the primer type of presentation, it is not involved in technicalities which would render it too advanced for the use of these men. For discussions and indoor classes the presentation will serve admirably; for field instruction with C.C.C. enrollees, or with others, the material will require the use of more specific subject matter of an outline or project nature. For the camps this is presumably provided in the outline of instruction (Vocational Series No. 8) previously noted. This point is mentioned because this manual may serve in a useful way in elementary forestry instruction to groups other than those in the Civilian Conservation Corps camps. In fact it will be surprising if the book does not find a fairly wide use in elementary forestry instruction, and for this reason a

more general title than C.C.C. Forestry might have been desirable.

Specialists in the several branches of forestry may feel that their own fields have been treated with too much brevity. Yet as an outline in narrative form it covers most of the fields in forestry, and obviously could not present its material on a level with our standard texts. Professionally trained foresters in the C.C.C. camps will find it helpful, certainly as a guide, although they may think the presentations rather elementary in character. Foreman-instructors who have had no training in forestry will find the material of great benefit, although these men will be forced to look further if their instruction is to be effective.

Where so much subject matter is presented in one book, there is bound to be, here and there, some material which is not too logically correlated. This is, of course, a personal opinion and a criticism of minor character. Chapter VI, "Systems of Timber Management", is a case in point, in that it is essentially a general discussion of silviculture, after which are several sections dealing with farm woodlands. Why should there not be a similar presentation in the same chapter on the larger areas of privately owned forests?

Those charged with the placement of forest school graduates will be inclined to challenge the statement on page 301 to the effect that "increasing numbers of foresters are being employed by lumber companies, pulp and paper manufacturers, and other industrial forest organizations." The reviewer noted on page 296 that at present nearly 4,000 students are enrolled in our forest schools. Actually over 6,000 were enrolled during the first term of the academic year 1936-37 (Jour. For., January 1937).

Not only is this manual illustrated profusely with excellent and modern photographic reproductions, but on almost every page there are from one to five

admirably executed pen and ink border sketches to illustrate the text. Besides the cross-reference guide, the appendix includes a list of one hundred important trees with common and scientific names, and a glossary of forestry terms. An excellent index is included.

C. H. GUISE,
Cornell University.



Norway Spruce in Northeastern United States—A Study of Existing Plantations. By N. W. Hosley. *Harvard Forest Bull.* 19. 80 pp., 99 figs. 1936. Price 50c.

That there is entirely too much guesswork in reforestation in the United States is generally admitted. This bulletin aims to give helpful information on the production and care of Norway spruce, one of the leading trees used in reforestation in the Northeast. It is based on a study of 57 plantations between seven and seventy years old in Connecticut, Massachusetts, New York, and Vermont.

Among the practical subjects considered are size of planting stock, season of planting, spacing distances, rate of growth, and possible yield. Nine pages are given to the consideration of planting mixtures and in the appendix are several helpful volume and yield tables. A few of the principal enemies of Norway spruce are treated briefly. A special feature is a comprehensive classified bibliography of 242 titles, chiefly European. Rarely does one find so complete a bibliography in a short bulletin on a single forest tree.

This bulletin contains a lot of valuable information for foresters and tree planters in general. Its discussions and conclusions should be helpful in developing enlarged reforestation, especially in the Northeast and the Lake States.

JOSEPH S. ILLICK,
N. Y. State College
of Forestry

Our Natural Resources and Their Conservation. Edited by A. E. Parkins and J. R. Whitaker. xii + 650 pp. *Illus.* John Wiley & Sons, inc., New York. 1936. Price \$5.

With the revival of public interest in the conservation of our natural resources during recent years, it is not surprising that a new treatise on this subject should appear. Dr. Parkins, who teaches geography at the Peabody College at Nashville, Tenn., and Dr. Whitaker, Assistant Professor of Geography at the University of Wisconsin, decided two years ago that there was a need for a new conservation handbook. They have assembled an imposing array of twenty-two contributors, including themselves, all of whom are or have been associated with the teaching of geography. "They (geographers) have been doing most of the teaching of conservation, as a subject or field, in our colleges and also at elementary and secondary levels of instruction. The rising generation is learning largely through geography teachers and textbooks about the aims and practices of conservation."

The book is a timely one; it catches some of the growing enthusiasm for solving our conservation problems. Only through the medium of a symposium could such a treatise be prepared in these busy days. The book lacks unity, but this is to be expected when we consider that in only two instances are authors at the same institution. There is duplication which might have been avoided and even sections which might have been dispensed with under careful coordination. The inequality of source material on the several subjects and the variation of degree of specialization in the subject matter by the authors themselves are quite apparent. One will not find in the book much material of value in advanced study, for "the treatment of each phase cannot meet the detailed needs of

students specializing in that particular sub-division." The ranks of conservation-minded people should, however, be materially swelled through the use of this textbook in the education of the general public.

Although there has been a commendable shift in arrangement of material in contrast to Van Hise's original treatment of the subject and the revision of his book, one gets the feeling that the ultimate in logical structure for a treatise on our natural resources and their conservation has not yet been attained. Instead of treating minerals, water, forests, the land, wildlife, and the conservation of mankind in that order, the new treatise, after an admirable introduction, takes up land, forests, water, minerals, wildlife, and the conservation of man. In addition, it introduces such subjects as resources in relation to the manufacturing industry, recreational resources, and state and national planning. All of the new subjects are handled by individuals under forty, whereas the principal subjects are handled by older men. The section on "Conservation of Natural Resources and the Manufacturing Industry" appears to be superfluous in view of the inclusion of the subject matter in other chapters. Recreation may now justify a chapter to itself, but as written could well have been included in other sections for it outlines in a provincial way the various types of recreational use of natural resources. With the inclusion of two chapters on planning, recognition is given to the fact that the ideals of conservation can be attained only through the enactment of a definite legislative program based on sound plans.

The current emphasis on land and water resources is reflected in the treatment of these subjects. "Land" requires eight chapters and "Water" four chapters. The disposal of the public domain is handled historically in the first chapter of the section devoted to a consideration of land

resources, followed by an excellent classification and discussion of soils. A lengthy treatment of soil erosion and its prevention is supplemented by a chapter on "Tree Crops." Three distinctive classes of land; namely, arid and semi-arid lands, the grasslands, and wet and overflow lands, are given special attention. The first two of these might have benefited by a preview of Senate Document No. 199, "The Western Range," which apparently was not consulted. The section on land ends with a chapter "The Agricultural Prospect," which comprehensively considers the prospect for consumption of farm products, for agricultural production, for standard of living, and for rural culture.

Part IV devotes considerably more space to water resources than has been given in the previous books on conservation. A general chapter on "Water Supply for Domestic and Industrial Uses" is followed by detailed examination of the problems of waterpower, waterways and their utilization, and floods and flood control.

Although it is invidious, in commenting upon a symposium, to single out specific sections for detailed criticism or praise, the reviewer cannot pass up the opportunity to call attention to the chapter on "Our Mineral Treasures." Although in a footnote "the writer claims little originality of material," the subject matter has been intelligently and originally handled. The chapter contains an unusually fine mixture of the essential ingredients of historical background, inventory of resources, and a consideration of the principles of conservation, their application and effectuation. It suggests the integration of legislation and education; it is international, rather than national in scope. This exposition might well serve as an inspiration to authors having the responsibility for the preparation of later treatises on our natural resources and their conservation.

Foresters reading this book may feel

that forestry has suffered at the hand of geographers. True, in one or two chapters the role of forests is entirely neglected and in others it is not accorded the emphasis which a forester would give. The frontispiece, however, calls attention to the fact that "forest conservation was the initial movement in resource conservation" and the introductory chapter repeatedly calls attention to the active participation of foresters in the conservation movement.

Although the two chapters concerning forest resources and their conservation were prepared by a geography teacher without technical forestry training, they cover this subject in a thoroughly logical fashion. After outlining the past and present status of our forests, the author takes up the essential measures in forest conservation. The author's dependence upon secondary source material is quite evident and foresters will find several questionable and a few incorrect statements. In view of these, it seems inexcusable that the author did not entrust the critical reading of the manuscript to some qualified forester rather than to a fellow geographer. Some readers will object to the statements on timber scarcity among which is "the Nation does not face timber starvation, though a considerable decline in national cut in the near future seems inevitable. . . ." Others will consider several of the recommendations liberal. On the whole, however, the chapters are well written and should advance forest conservation.

The format of the book is excellent. The text is enriched by a large number of photographs, charts, and graphs, and is supplemented by a modest appendix of three maps and some basic data which are derived from the 1930 census. A selected bibliography lists a few references which may be used in supplementary study of the subject matter on each chapter.

This treatise is designed primarily for

classroom use, but it should find a large body of adult readers with a general interest in conservation problems. Most of the chapters are simply and interestingly written. In reading it one must keep in mind the difficulties of presenting a book on contemporary problems through the medium of a large number of authors. Differences of opinion will naturally arise as to the highlights which should have been emphasized; some statements are already out of date, and in the light of prospective developments, others soon will be. The conservation movement, however, will be materially advanced through the wide use of this book in our schools and homes for it brings together under a single cover the pertinent writings on the subject.

F. A. INESON,
U. S. Forest Service.



Development and Succession of Forest Fungi and Diseases in Forest Plantations. By Dow V. Baxter.
Univ. of Michigan School of Forestry and Conservation Circ. 2, 45 pp., 9 pl. 1937.

This thought-provoking circular should be read by every forester concerned with reforestation. Although it discusses the pathology of plantations in only a few localities in Michigan, yet the ideas developed are of universal application. The plantations investigated include both native and exotic species as well as native species so far outside their natural range that they are essentially exotics. The trees are suffering more or less severely from a succession of diseases caused by both non-infectious and infectious agents. The infectious diseases are caused by various fungi, some of which were previously unknown in the localities where the plantations occur; others, although widespread, are relatively unimportant in naturally reproduced stands on suitable sites

within the native range of the host. While exotics are suffering most severely, native trees are also diseased, indicating that plantations are inherently more liable to disease than natural reproduction. Consequently most plantations need tending if they are to prosper, so that higher expenditures are necessary to insure the success of plantations than are required for naturally reproduced stands.

The data bring out the importance of site in relation to disease, emphasizing the old but frequently neglected principle that no amount of doctoring can save a plantation on an unsuitable site. Too often, disease is attributed solely to a parasite when actually the parasite is secondary and would not be able to damage vigorous trees on a suitable site. This fact is brought home with particular force to any one who has observed the extensive artificially reproduced stands in Europe. Investigations similar to this one in Michigan are essential adjuncts to reforestation in other regions of the United States.

J. S. BOYCE,
Yale University.



Forest Pocket Book. By S. H. Howard.
4th ed. xvii + 559 + xxi pp. Superintendent, Printing & Stationery, Allahabad, India. 1937.

The popularity of this handy pocket manual for Indian forest officers is indicated by the fact that the second edition was sold out and the third printed within a year after publication. This, the fourth edition, contains considerable new material. As the author modestly says: "If you are an expert on any subject please do not look it up in this book. It can tell the expert nothing. If you will look up something in which you are not an expert it may help you." However, few forest officers are likely to be experts on all of the many subjects treated in the

book. Among them are general notes on artificial regeneration; silvical notes on important species; yield and volume tables for 10 commercial trees; notes on seasoning, preservation, grading, and other phases of utilization; use of concrete, mortar, paint, varnish, and plaster; veterinary notes and management of elephants, mules, and oxen; poisonous snakes; fish and game laws; and miscellaneous tables.

W. N. SPARHAWK.



Introduction to Research on Plant

Diseases. By A. J. Riker and Regina S. Riker. *III + 117 pp., 19 fig. (Planographed.) Univ. of Wisconsin, Madison. 1936.*

Although this book is primarily for students and investigators in plant pathology it is valuable to all research workers in botany or forestry. The chapters on foundation of a research problem which includes the mechanics of handling literature, on statistical analyses, and on records and manuscripts which includes directions for photography and preparing illustrations for publication, particularly can be read with profit. For workers in forest pathology who are not constantly using laboratory technique the volume is an invaluable guide.

J. S. BOYCE,
Yale University.



International Yearbook of Forestry Statistics 1933-1935. Vol. I. Europe and U.S.S.R. Compiled under the direction of Valentino Dore. *xii + 327 pp. International Institute of Agriculture, Rome. 1936. Price 25 Lire net.*

The most worthwhile publications of the International Institute of Agriculture in the field of forestry, with the possible exception of the proceedings of the international forestry congresses, are its compilations of international forestry statistics. The first of these, issued in 1925,

was very incomplete. The second, which gave the statistics as of 1932, covered more ground. So much new material was available for the latest edition that could not all be published in one volume.

The data are compiled largely from official reports of the individual countries. As might be expected, there is little uniformity in the scope—and probably also in the accuracy—of the statistics. Dr. Dore's staff appears to have done an excellent job of synthesizing the available material. This is particularly true of the statistics on timber trade, which make up two-thirds of the book. These include exports and imports of each country by kind of product, classified as uniformly as possible, and expressed both in metric tons and (for most products) in cubic meters.

Statistics of forest resources are given in 12 pages of summary tables, showing areas, ownership, kind of forests, volume of standing timber (for only 8 countries), annual increment (for 14 countries), and annual cut. It is interesting to see that some countries with intensive forestry, such as France, Germany, and Switzerland, make no estimates of timber stand or increment but that such figures are given for Russia, much of whose forests has not yet been explored. Besides the summary tables, in which the official statistics are reduced as far as practicable to common denominators, there are 96 pages of tables for the 30 individual countries. These give much detailed information, depending on the character of the original data, and list the sources from which they were derived.

The Yearbook does not attempt to analyze or interpret the statistics or to draw conclusions from them. It merely presents them in a convenient form for the use of interested persons, few of whom would have access to the extensive and polyglot source material. Dr. Dore is to be congratulated on the success with which he has carried out a difficult piece of work.

W. N. SPARHAWK.



CORRESPONDENCE



The President,
Society of American Foresters,
DEAR SIR:

The general tendency for the younger members of the Society of American Foresters to sit back and listen while a small group of older individuals carries on has often been commented on. This, as natural in any such organization which comprises a range of age and experience, is due in part to our lack of experience and our respect for the wisdom of the older professional men, but for the greater part because it is easier to do or say nothing. On the other hand, we do represent a considerable per cent of the Society's number, especially so, with the recent large increase in members, and should, undoubtedly, force ourselves to comment, either pro or con, on the policies dictated by the leaders. For, after all, it is the newcomer to the house who notices the picture which hangs unevenly on the wall.

Having read over the report of the Editor-in-Chief of the JOURNAL which appeared in the January issue of the S.A.F. AFFAIRS, I wish to present my own opinion concerning the unsuitability of the present JOURNAL for the majority of the Society members.

Mr. Smith feels that changes in the appearance or dress of the JOURNAL would be desirable. Although this is true to a certain extent and would be obligatory if the publication needed to compete for its existence with present news-stand material; still in all, since we, as members looking for representation of dues value, are sure to look through each publication at least once, such considerations

are not necessary to increase the value of the JOURNAL to us.

But, as I have implied in the statement above, "to look through—at least once," it is the contents of the JOURNAL which lead me to state that the Society is losing the effectiveness of its principal bond between members by printing material better left for technical bulletins and research publications. Besides the weightiness of such articles, they are, in a great many cases, distinctly sectional and as such, of interest only to members from the part of the country concerned. In a great many instances when the material is or would be printed in another publication, I feel that a brief review or summary of the paper, together with reference to the source where detailed information could be obtained, would be sufficient. This is written with all due respect to the fine job Editor-in-Chief Smith has done in selecting and editing material in accordance with the present JOURNAL policy.

Interesting as all this material may be to Experiment Station workers and University professors, who incidentally, do the greater part of the contributing, I venture to say that the average Society forester in the field very seldom gets beyond the title and first paragraph system of reading his JOURNAL. Of course, I am not in a position to back up this statement, but it might be worth while for the Society to send out a questionnaire or invite comments on its own publication.

I am venturing my statement because, in spite of the fact that forestry is vitally interesting to me and I have no pet aver-

sions to scientific papers, the contents of the JOURNAL itself leave me cold, and my copies pile up on my desk with an average of less than two articles read each month. Since forestry is such an interesting subject, let's make the JOURNAL so. Let us obtain our technical data from the Government Printing Shop, libraries, and University presses, and use the JOURNAL as a medium for bringing our Society members closer together. Just as the same foresters who sit mute in a scientific meeting, wax loquacious around a camp-fire; in like manner, if the JOURNAL should throw off its cap and gown, you would find more contributions in the mail-box from all of us.

By no means, am I suggesting that the JOURNAL change to printing stories about the big rattle-snake that Forester "Jim" caught along Horse-shoe Creek but rather to the presentation of such material as descriptions of individual forests throughout the country so that we might get a better picture of conditions in the nation as a whole, or practical problems which confront a forester in the field and their solution. We saw enough theory, life histories, and formulas in college. What we need now is to know something about forestry which will allow us to obtain a better understanding of what our profession is doing in the field, something from which we may borrow material to make our conversations and speeches more professional and yet at the same time interesting, and last of all something which we can read from cover to cover as a live issue, not something to be filed away and referred to like an encyclopedia. By all means, technical papers of interest and of broad regional import should be included, but a better balance than is found in the current issues should be struck.

So, with all due respect to those individuals who have a sufficient thirst for technical knowledge or the necessary will

power to wade through the JOURNAL, request that something be done for the bulk of us, or to be informed that I am following a train of thought entirely by myself. If we are to be a strong Society, pulsing with young blood, and you wish the dues from the members to continue their annual migration to Washington, then tell the highly technical contributors to refrain from trying to out-equip each other and leave room for material digestible for palates turned out by the present forestry school system. After all, we can't make ourselves appear more professional by talking unintelligibly to each other. Let's have a JOURNAL that will help to build professional men and not give to our new members a picture so lifeless and complicated as to discourage their desire to be professional.

Please give my fellow-workers a chance to express themselves on this question and I warrant that a great many will have the courage to agree with me, even though the psychological reluctance to admit that the JOURNAL is over their heads would be working against my side.

L. R. HOLDRIDGE.



DEAR CHAPMAN:

I was interested in your article in the March JOURNAL on "Regional Trends of Instruction in Professional Forestry", and want to comment on one point.

Discussing the southern region, you say "Much thought and study have been put on the subject by other colleges in South Carolina, Alabama, Arkansas, Mississippi and Tennessee, all of which have offered elementary courses in forestry the first two academic years." The University of Virginia is not included in the southern region nor any other.

Year-long courses have been offered any academic students here since 1921. I taught one general course from 1921

1928, while I was State Forester. In 1928 Alfred Akerman took it over on a full-time basis, teaching one general, elementary course and four others, not all in the same year. They are designated Silviculture, Forest Policy, Forest Management and Lumbering and Utilization. Since 1935 I have been doing the teaching, on a permanent, full-time basis, while Mr. Akerman is developing a research and demonstration forest, in southeast Virginia.

I taught Policy last year and am teaching Management this year (using your admirable text-book on Management), and am planning and supervising the development of the University's 300 acre woods immediately adjoining the campus as an out-door laboratory for instruction in forestry. I have had almost the full time of a C.C.C. crew for the past year. I am also doing what I can to procure a forestry library and simple facilities.

The number of students is small, but I get a good response from most of them. The University has no plans to establish a professional school. I have never advocated such a procedure. The location, however, and some other features are favorable. There is no professional school in the mountains, south of Penn State. We are at the edge of the mountains, in the shortleaf pine and hardwoods region. The boys who enroll here want field-work. I am developing the opportunity to give it to them.

CHAPIN JONES,

*Professor of Forestry,
University of Virginia.*



DEAR PROFESSOR CHAPMAN:

I doubt that you will recall meeting me in San Francisco in the early 30's when you were out there visiting the Society of American Foresters' California Section. However, I recall you very vividly and

I feel that you have put a great deal of life into a society which in my opinion has been slowly dying for the last fifteen years. I presume from this statement you will suspect that you are about to have a letter from a radical, and perhaps you are not far wrong.

For quite a long while now I have been wondering why the Society of American Foresters as a body does not resort to more publicity than has been exercised. About two weeks ago in a Lincoln Sunday paper there was a whole section devoted to a proposed plan by an army engineer to control the floods of the United States through a system of dams. Now there is no reason why an engineer should not express his opinion and why he should not propose a plan, if he thinks it is a sound one. But I do not believe that there are many people in the plant sciences who will agree with his plan. I, for one, am willing to admit that perhaps temporary dams may be quite essential, but probably a permanent solution to the problem is in a thorough vegetation of the watersheds. I am fully aware that government agencies such as the Soil Conservation Service, Resettlement Administration, and Forest Service are actively engaged in this type of work, and yet the amount of work which they are able to accomplish is almost insignificant compared with the actual need. What I would like to see would be a committee composed preferably of men outside of the government service, university professors if you please, and this committee should make it a point to get out publicity counteracting such bizarre statements as appear in the daily papers. The statements of this committee should be calculated in the end to really bring forestry to its rightful position in the minds of the citizens of this country.

Now within our own ranks we are all fairly well in agreement, but how about the layman? Will he ever be informed properly if we continue in our present

methods of expressing ourselves only through our official journal? I, for one, feel that the day of saw-log forestry is waning and that in the future we will need vegetation far more for the protection of watersheds, recreation and erosion control. To be sure, production is still of importance, and should not be neglected, nor should it be over-emphasized.

Then, too, we have the rising generation of young foresters who will be demanding positions in the near future. While it is not the fault of the Society of American Foresters that there has been such an increase in the enrollment of forestry students, I do believe that it is part of our duty to try to utilize all possible opportunities for employing these boys. To me it seems that we are overlooking a very fine opportunity if we are going to allow the engineers to get away with this dam-building program.

Isn't there some way that we can get publicity out of the people so that they will appreciate vegetation as one of the most important and most permanent means of watershed protection? I think it is high time the Society of American Foresters should express an opinion on this matter, and put the opinion in such a place that it will be available to the bulk of the citizens of the United States, and not keep these opinions to ourselves as we have done in the past. Perhaps there is some by-law of the Society that proclaims against this. If such is the case, I am not aware of it but I will be very much in favor of seeing that by-law altered.

I know that you will probably take this as just one of those letters coming from some member who has been extremely worked up about some subject in which he is particularly interested. However, in my particular case I do not feel that this is so.

May I repeat, can we as a Society continue to operate within our own sphere and at the same time feel that we are

actually serving the people of the United States to the extent we are capable of?

ERNEST WRIGHT,

*Division of Forest Pathology,
Bureau of Plant Industry.*



DEAR MR. WRIGHT:

When I get a letter like yours it encourages me to think that we are on the road towards making the Society effective for forestry in the U. S.

Publicity of this sort is to me a legitimate and necessary activity of our organization and should be undertaken vigorously and effectively.

We have a committee on watershed protection, which would be the logical body to look after such efforts, and I have hopes that this may be accomplished.

We also will have as the new Executive Secretary a man from whom much good work can be expected.

H. H. CHAPMAN,

President,



To the Members of the
Committee on International Relations,
Society of American Foresters:

GENTLEMEN:

In that our Committee never meets and that only seldom do any number of its members get together, perhaps it may do no harm if I send you, as I do herewith, a copy of a report of its activities in 1936. I forgot to get this in on time. Chapman suggests that I file it now.

It contains one or two suggestions that I should like to pass on to the other members. Perhaps I have handled things too much myself. I am, however, always glad of suggestions and I hope as individuals all of you are keeping up contacts with foresters overseas, as I have indicated was the case. My personal good wishes.

RALPH S. HOSMER, *Chairman,*

Committee on International Relations.

DEAR PROFESSOR CHAPMAN:

May I submit now the report from the Committee on International Relations for the year 1936? I overlooked the fact last December, that it was due prior to the annual meeting, and then thought, until your recent letter, that it was too late to turn it in. It can now go directly into the files.

The Committee on International Relations has a rather large personnel—twelve members—and is very loosely organized. Its functions, as the chairman conceives them, are primarily: (1) to be of help to foresters from other countries when such men visit the United States; (2) to aid the Executive Secretary in answering requests that come in from abroad concerning various phases of forestry in this country; and (3) in general to be ready to be of service as need arises on special occasions when members of the Society are concerned with some meeting of international importance, or in other ways where cooperation between the foresters in one or more other countries is involved.

Under (1) visiting foresters have from time to time been helped to arrange their itineraries, to meet the persons with whom they most desired to confer, or to see places of interest which they might otherwise overlook. These efforts have been appreciated and are, the Committee feels, worthwhile.

(2) Every year a number of requests are received from foresters in other countries for information on specific questions. The Committee has helped answer not a few such inquiries through arranging to put the correspondent in touch with one or more American foresters who were authorities on the matters in question, or by seeing that federal or state publications were forwarded to him.

Perhaps the third item is the Committee's most important function. A skeleton organization, dormant much of

the time, it can nevertheless be brought into action immediately when needed, as it has been at various times in the past. Ordinarily the chairman handles personally most of the matters referred to the Committee, but he often calls on the other members to do particular things. He himself is in frequent correspondence with foresters in various countries overseas, as he believes are several of the other members of the Committee as well. All this, it seems to him, is to the good as a help toward maintaining cordial international relations among foresters. Perhaps in practice it is as effective as would be attempts of a more formal nature to set up and maintain such contacts.

In theory all of the members of the Committee are supposed to bring to the attention of the whole Society, through notes in the JOURNAL, or S.A.F. AFFAIRS, happenings abroad which may not be generally known, that are of special interest to foresters in the United States.

Because of the reviews in the JOURNAL and other magazines that are seen regularly by many members of the Society, and the Current Literature bulletins of the Library of the U. S. Forest Service, the Committee has not charged itself with the duty of keeping track of new publications in forestry put out in other lands. On several occasions, however, the chairman has brought to the attention of the Forest Service new bulletins, especially from the U.S.S.R., of which he had received copies that for some reason had not been sent to the Forest Service Library. Some of these proved to be useful in Forest Service projects just then under way. It would do no harm if all members of the Committee would bring to the attention of E. N. Munns, Division of Silvics, U. S. Forest Service, Washington, D. C., in a similar way rare or unusual publications from abroad which may come to their attention.

Possibly the most important service

rendered by the Committee during 1936 was the handling of what proved to be a somewhat voluminous correspondence relating to the Second International Congress of Forestry, held at Budapest, Hungary, in September. Its purpose was to arrange details and so smooth the way of those in the American Delegation who went over as representatives of the Society.

An account of that meeting, and of another, that of the International Union of Forest Research Stations, also held in Hungary just prior to it, was published in the JOURNAL OF FORESTRY for December 1936, Vol. 34, No. 12. Ten members of the Society of American Foresters, with four others, a group of lumbermen sent

by the Oberlaender Foundation, made up the American Delegation.

The officers of the Organization Committee of the Congress expressed in much more than formal terms their appreciation of the cooperation given them in the United States. All this helped to make the Congress a success and established cordial relations with Hungarian foresters which should be of value in the future.

The members of the Committee of International Relations are: Ralph S. Hosmer, Chairman, N. C. Brown, R. S. Kellogg, E. N. Munns, A. C. Ringland, J. P. Kinney, R. C. Bryant, J. D. Guthrie, G. S. Perry, Barrington Moore, Ward Shepard, W. N. Sparhawk, P. L. Buttrick.

RALPH S. HOSMER, *Chairman,*
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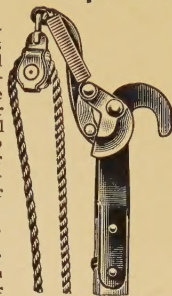
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